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AR308124



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**SUPPLEMENTAL SOIL INVESTIGATION
AT THE
NCR MILLSBORO, DELAWARE, NPL SITE
DRAFT REPORT**

**PREPARED
BY
ENVIRONMENTAL STRATEGIES CORPORATION**

NOVEMBER 7, 1990

REGIONAL OFFICES
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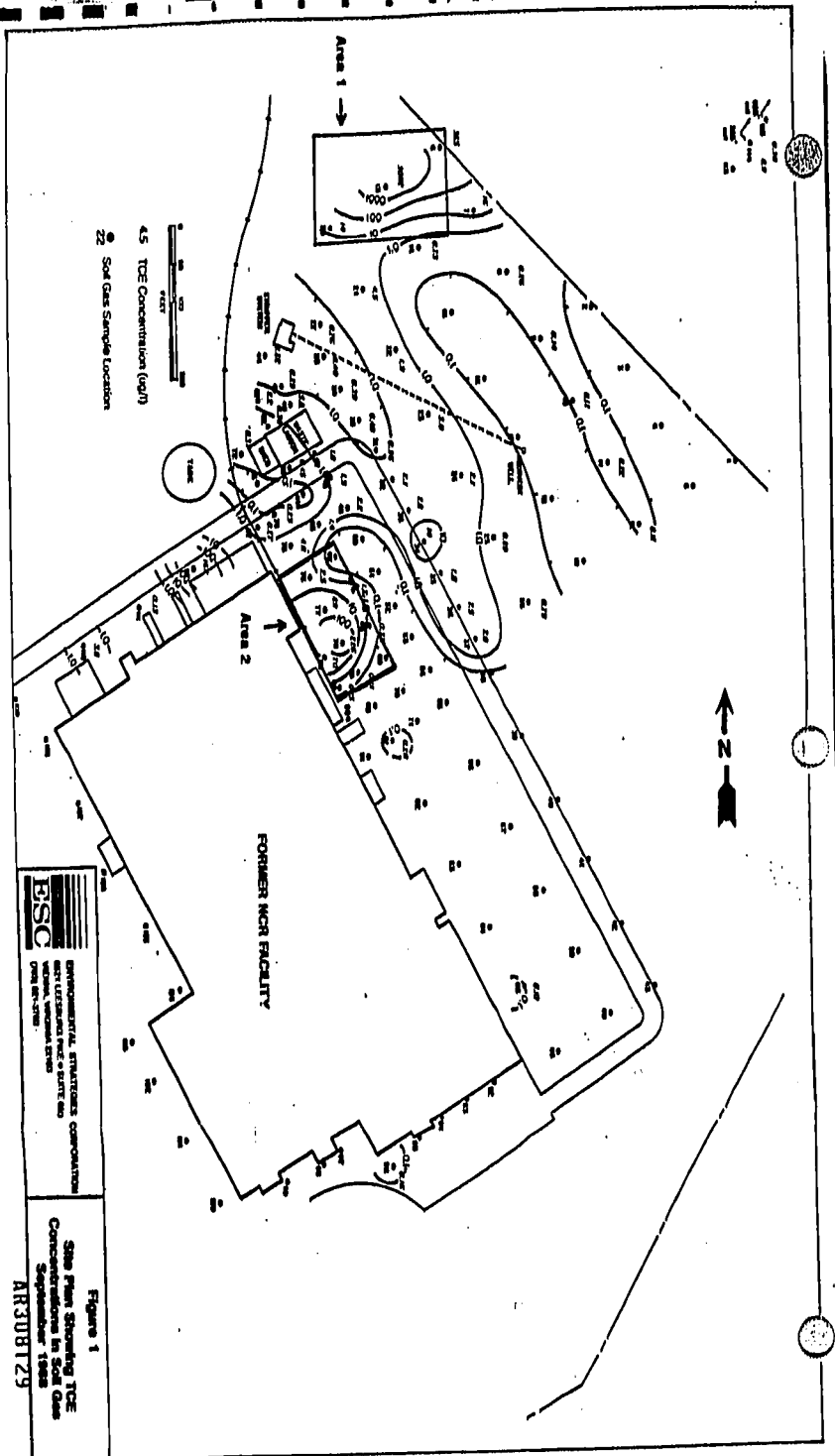
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- Appendix B - Soil boring logs
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Introduction

In this report, Environmental Strategies Corporation (ESC) presents the results of additional investigations conducted to determine whether there are hazardous constituents present in the soils at the former NCR Corporation facility in Millsboro, Delaware. The investigation focused on the northeast corner of the property (Figure 1, Area 1), where elevated levels of trichloroethylene (TCE) were detected in a soil gas survey. Additional investigations were also conducted at the rear of the building (Figure 1, Area 2) and are discussed in detail in this report. An aboveground TCE tank was formerly located at the rear of the building, and its use may have resulted in releases of TCE to the ground surface. Concentrations of TCE in groundwater in this area are more elevated than those in other areas of the site. These two areas were identified as a result of the Remedial Investigation (RI) conducted in 1988 and 1989. The additional investigations were conducted to characterize more fully the potential sources of contaminants in these areas and to fill in data gaps that were identified in compliance with the objective of the Remedial Investigation/Feasibility Study (RI/FS) process.

During the investigation of the area near the rear of the building, split-spoon soil samples were collected from each of four soil borings in accordance with the Work Plan dated May 1, 1990, and analyzed for volatile organic compounds (VOCs). The soil boring locations were selected so that the sampling results could be compared with results from previous soil borings in the same area.

The investigation of the northeast corner included several tasks. A magnetometer survey was performed to identify potential magnetic anomalies that may indicate the presence of ferrous materials (drums or containers) in the area. Three soil borings greater than six feet deep were installed, and split-spoon samples were collected. Three 6- to 10-foot deep trenches were constructed running east to west to observe field conditions and to collect representative soil samples. Five soil borings less than six feet deep were installed west of the trench



containing soils with the highest concentrations of TCE. Samples from those borings were collected and analyzed to characterize the contamination and to delineate its extent. Samples from the trenches and borings were selected for analysis based primarily on visual observation of contamination and screening with a photoionization detector (PID) or organic vapor analyzer (OVA). However, additional sample selection criteria, based on contaminant distribution and representation were also used to define the limits of contamination and to confirm the absence of contamination in some locations.

Background

In accordance with the October 8, 1987, Remedial Investigation Work Plan prepared for the Millsboro facility, a soil gas survey was conducted at the site on September 20 and 21, 1988. This survey was conducted to detect and quantify the concentrations and distribution of VOCs in the vadose zone soils at the site.

Because the levels of VOCs in soil vapors may correlate with the concentrations of VOCs in groundwater, the results can be used to guide the selection of locations for subsequent groundwater monitoring wells and soil test borings to locate and delineate the sources of VOC contamination. The data resulting from a soil gas survey are limited because they only indicate the concentration of the vapor form of a contaminant at a specific depth, location, and time. The results only provide a rough indication of the concentrations of the contaminants in the soil.

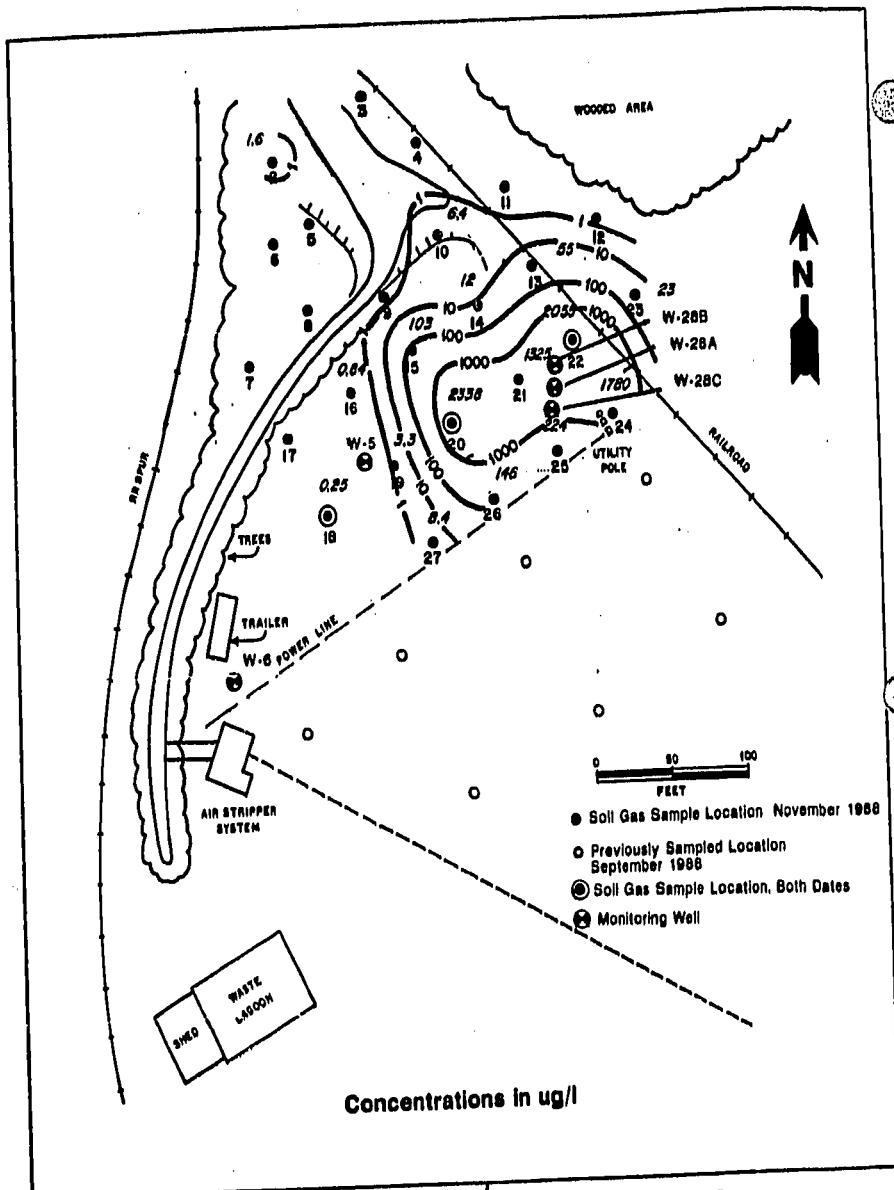
The site was sampled initially on a 100-foot grid. The investigation is described in detail in Chapter 4 of ESC's August 18, 1989, draft "Remedial Investigation Report for the Former NCR Corporation Facility." Analysis of the samples by gas chromatography/electron capture detector (GC/ECD) revealed the presence of chlorinated hydrocarbons, primarily on the northern portion of the site. TCE was observed at the highest concentration in the vadose zone at station 13 (Figure 1, Area 1), located in the northeast corner of the site. It was suspected that the VOCs may have been present in soil gas as a result of possible past disposal practices in the northeast corner of the site near where well cluster W-28 is presently located (Figure 1, Area 1).

To verify and define further the limits of vadose zone contamination, an additional soil gas survey was conducted in this area on November 1, 1988. A total of 27 additional samples were acquired using a 50-foot grid spacing to focus the study and delineate the area of concern. To provide continuity with the previous study, three samples were analyzed from locations previously sampled.

Although the concentrations of TCE detected at these replicate sampling points do not correspond quantitatively, the relative concentration patterns were similar (Figure 2). Predictably, the highest reading obtained in the November 1988 survey was at station 20 (which is identical to station 13 in the September survey). The November 1988 survey showed elevated TCE levels extending eastward to the railroad tracks. Steep lateral gradients indicate very limited spreading through the vadose zone toward the north and east.

In accordance with the RI Work Plan, 14 soil borings were installed above the water table to evaluate the presence of TCE in the vadose zone. These activities are described in detail in Chapter 4 of ESC's August 18, 1989, draft "Remedial Investigation Report for the Former NCR Corporation Facility." Three of the borings, SBV6, SBV7, and SBV8, were located in the newly suspected source area in the northeast corner of the property (Figure 2). At SBV6, split-spoon samples were taken to a depth of six feet below grade. The sample from the interval between four and six feet contained a TCE concentration of 4.0 ug/kg (estimated value, below the detection limit). Split-spoon samples from SBV7 were taken to a depth of 10 feet below grade. The sample from the interval between six and eight feet contained a TCE concentration of 3.0 ug/kg (estimated value, below detection limit). SBV8 was sampled to a depth of 10 feet, and the sample from the interval between 2 and 4 feet showed a TCE concentration of 17 ug/kg. The sampling results are presented in ESC's "Draft Remedial Investigation Report," dated August 18, 1989. No conclusions were drawn regarding the distribution of TCE detected in soils in this area, although these levels were not considered to be of concern.

The soil gas survey also identified a second area where TCE concentrations in the vadose zone may have been of concern (Figure 1, Area 2). This area was located at the rear of the building roughly bounded by well W-20 and well points WP-9, WP-20, and WP-6. The area is associated with the former location of an aboveground TCE storage tank and elevated TCE concentrations in groundwater. Six soil borings, SBV9 through SBV14, were completed in the soils in this area to locate potential sources of TCE contamination (Figure 3). At SBV12, the sample from the interval between 12 and 14 feet showed a TCE concentration of 1.0 ug/kg



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Figure 2
Northeast Corner Showing
TCE Concentrations in Soil Gas
November 1988

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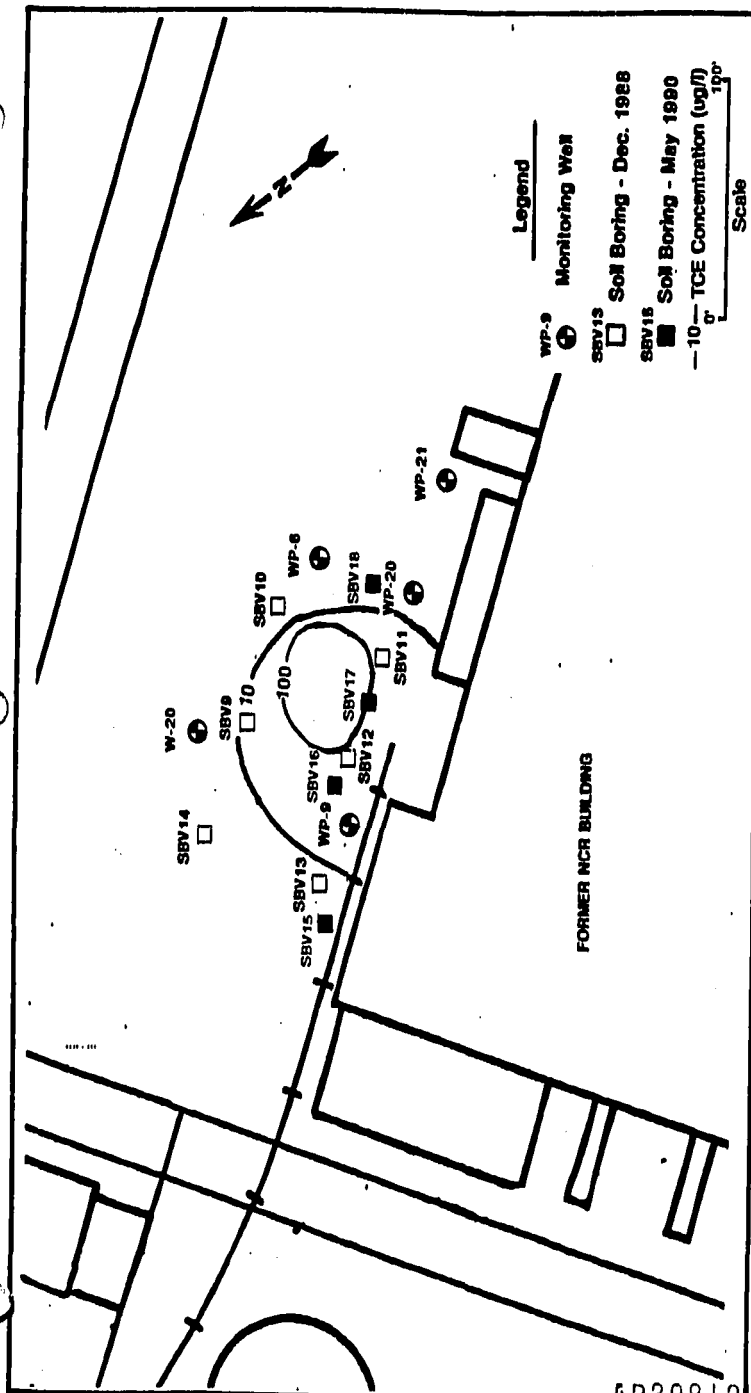


Figure 3

Back of Building Showing TCE Concentration Soil Gas Contours

September 1988

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(estimated value, below the detection limit). No TCE was found in any of the other samples collected from the six soil borings.

To determine the potential for the presence of buried wastes at the site, additional subsurface investigations were recommended in the draft RI. The 100- by 150-foot area within the soil gas TCE concentration contour of 1,000 ug/kg was investigated. The potential for localized TCE contamination of the soils overlying the area of highest groundwater concentrations was investigated as well.

Methods and Procedures

General

The initial scope of work for the investigation was described in ESC's 'Work Plan for Additional Soil Investigations' dated May 1, 1990. Under the Work Plan, the investigation of the area behind the building included the installation of four soil borings. The investigation of the suspected fill area in the northwest corner involved the completion of a magnetometer survey, the installation of three soil borings installed in native soils, groundwater, or in a clay layer and the construction of three trenches. Soil samples from the two areas were collected and screened for chemical analysis according to the protocol presented in ESC's January 30, 1989, "Project Operations Plan."

A headspace analysis was performed on each of the soil samples collected using a Foxboro OVA-128 flame ionization device and either a portable Photovac TIP or HNu P101 PID. Samples selected for laboratory analysis were sent to the CompuChem laboratory in Research Triangle Park, North Carolina. All boreholes completed were subsequently sealed with bentonite grout.

All sampling equipment was decontaminated according to ESC's April 4, 1988, "Quality Assurance Project Plan (QAPP)" and Project Operations Plan. A field decontamination station was prepared near boring and excavation activities. Decontamination included washing sampling equipment with nonphosphate soap and tap water and a tap water rinse followed by rinses with acetone, a dilute 10% nitric acid solution, and distilled water. Drilling and excavating equipment was thoroughly steam cleaned at the decontamination pad set up near the ESC trailer.

Methods and Procedures for the Area Behind the Building

Four soil borings were completed adjacent to well points WP-6, WP-9, and WP-20 on May 3, 1990 (Figure 4). Continuous split-spoon samples were advanced at 2-foot intervals to native

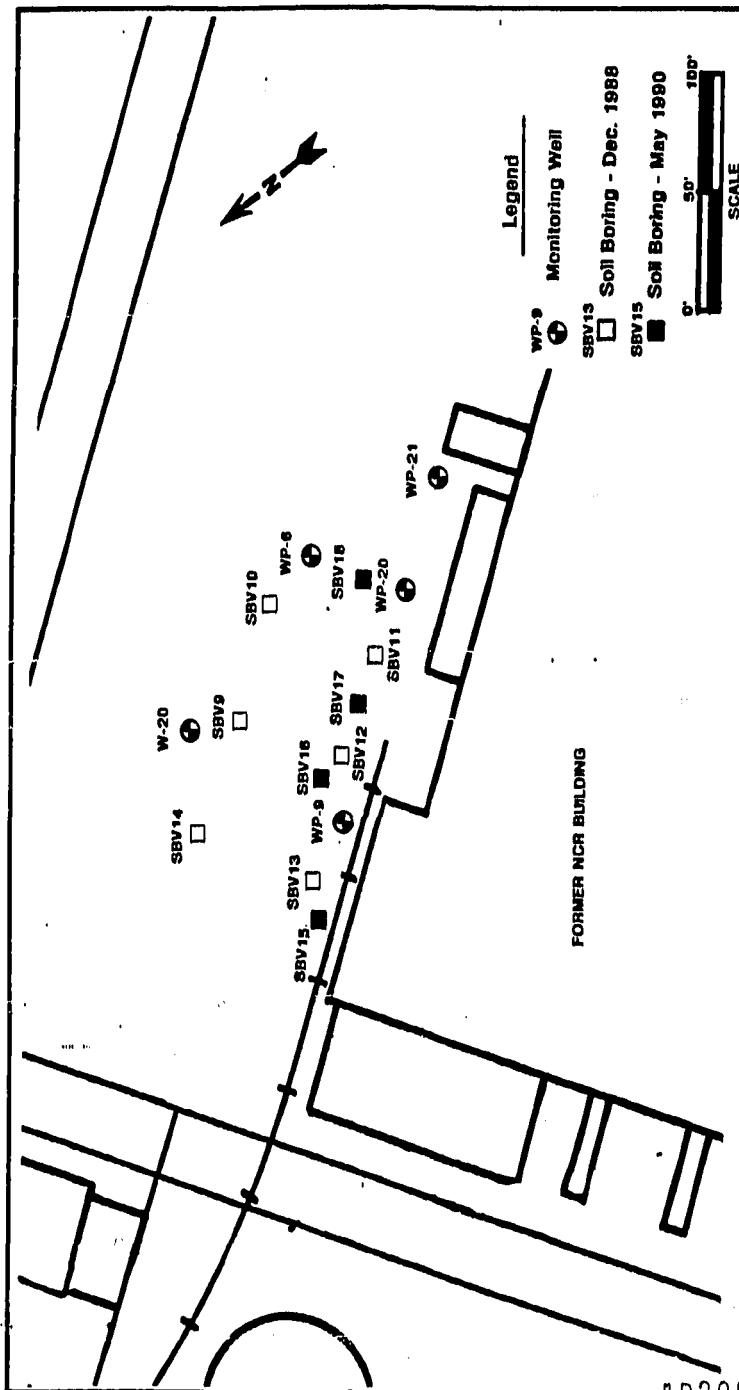


Figure 4
Location of Soil Borings Behind the Building

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soil, a clay layer, or to the water table using 4.5-inch inside diameter hollow-stem augers. As required by the Work Plan, no borings were completed through clay lenses.

Each split spoon was visually inspected and field screened with a PID, OVA, or both. Field screenings were performed by opening the split spoon and scanning the soil horizon to detect areas containing elevated levels of VOCs as indicated by the PID or OVA. The detector readings and visual appearance of each split spoon were logged. Two sample jars were filled from each split spoon. At the end of each day, field headspace analysis was performed on one of the two jars by unscrewing the lid and placing the detector probes inside the jar. The sample jars for headspace analyses were stored from approximately one to eight hours before the headspace analyses were performed, depending on what time of day the sample was collected. This allowed sufficient time for degasing VOCs from the soil, vapor accumulation in the headspace, and equilibration of the samples. The sample jars were stored in the van or office trailer during the period between sample collection and headspace analysis. The other jar of soil was saved in a chilled cooler for potential laboratory analysis, as determined from the visual inspection, field screening, and headspace results. The two samples with the highest observed headspace readings at each location were submitted for laboratory analysis. Samples that appeared to be contaminated on visual inspection were also submitted for chemical analysis. In cases where headspace readings and visual inspection failed to indicate potential contamination, the Work Plan called for samples of the 4- to 5-foot and 9- to 10-foot intervals to be presented for laboratory analysis.

These sample selection criteria were followed in all soil borings except SBV-21. The two samples having the highest field screening TIP readings from each boring were sent for laboratory analysis as stated in the plan (Table 1). However, where headspace analyses using the TIP and OVA varied from the field screening results, the field screening data were used for sample selection.

The criteria were not followed in boring SBV-21 because it was believed that more useful information would be obtained by conducting laboratory analysis of several samples at

and below the water table. This would enable a determination to be made of whether TCE was migrating to the water table from the stained soil area in the northeast corner of the site.

The Work Plan also required the collection of samples for chemical analysis from any encountered clay lens interfaces. Each of the samples submitted for laboratory analysis was analyzed for VOCs in accordance with the Work Plan.

Methods and Procedures for the Northeast Corner

General

The investigation of the northeast corner was carried out in four phases. The phases and their dates of completion are listed below:

- A magnetometer survey was completed on May 1, 1990.
- Three 12- to 14-foot below grade soil borings were installed and sampled on May 4, 1990.
- Exploratory trenches were constructed and sampled on May 7 through 9, 1990.
- Five hand-augured soil borings were installed and sampled on June 5, 1990.

In addition, a sample was collected from one of the trenches for characterization purposes in the area of highest field VOC levels and observed staining on June 5, 1990. This sample was analyzed for full hazardous substance list (HSL) organic compounds.

Initially, a magnetometer survey was conducted in the northeast corner of the NCR Millsboro site over the area of elevated soil gas readings. The purpose of the survey was to determine whether any metallic objects, such as drums, were buried in the area that could be the source of the elevated soil gas readings and to clear the area for subsequent soil boring and trenching activities. The procedures used for the survey are described in the magnetics standard operating guideline (Appendix A of the May 1, 1990, Work Plan). Data collected over the survey area were corrected for diurnal variation of the magnetic field by periodically taking readings at a base station. Anomalies identified from the corrected magnetometer data were investigated during the trenching operations. The survey results are provided in Appendix A.

Following clearance from the magnetometer survey, three soil borings were installed in a line running from east to west along the longitudinal axis of the 1,000-ppm contour identified by the soil gas surveys (Figure 5). The procedure used for the completion of the soil borings and the collection of samples was the same as that described for the four soil borings at the back of the building. The samples selected for laboratory analysis were analyzed for total chromium and VOCs.

The trenches in the northeast corner were constructed in a line running parallel with the soil boring locations (Figure 5). The May 1, 1990, Work Plan called for the construction of two trenches approximately 150 feet long running to a depth of 10 feet or to native soils. To cover a larger area of the 1,000-ppm contour and to increase the probability of detecting any potential sources of contamination, one of the trenches (Trench B in Figure 5) was split into three trenches and named B1, B2, and B3. Due to the apparent occurrence of high VOC concentrations, Trench B3 ended 110 feet from the origin of B1, rather than the 150 feet called for in the Work Plan. The first trench constructed, Trench A, was excavated in a straight line running approximately 150 feet. A small test pit, Trench C, was also constructed to investigate a magnetic anomaly identified by the magnetometer survey.

The Work Plan proposed the excavation of the trenches in stages, with the first stage at a depth of 4 feet and the second stage to a maximum depth of 10 feet or until native soil was reached. Data obtained as a result of the soil borings in the area and the excavation of Trench A indicated that native soils occurred at a depth of approximately six feet or less and that any potential contamination was generally observed at depths between two and four feet.

Because of difficulties associated with the collapse of the trenches, they were excavated to a depth of two feet in one location as an initial stage. Following the field screening and the collection of samples from that location, each trench was then deepened to six feet below the ground surface where sampling and observations were completed before continuing to the next location. Trenches were excavated to a depth of 10 feet in a few locations to complete observations on contaminant distribution in the soils.

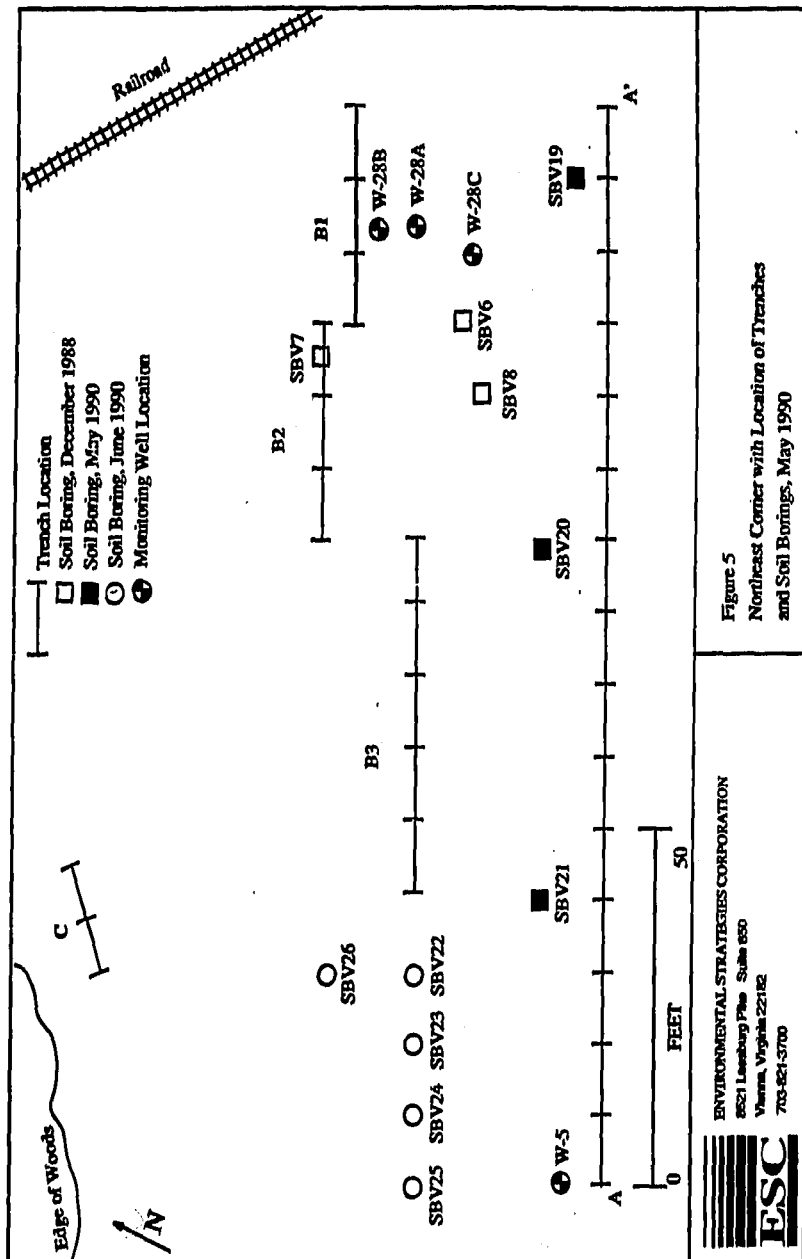


Figure 5
Northeast Corner with Location of Trenches
and Soil Borings, May 1990

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Trench A was constructed to a total length of approximately 150 feet. Trench B was constructed in three sections running east to west, with the easternmost section (B1) being 30 feet in length, the middle section (B2) being 30 feet in length, and the last section (B3) being 50 feet in length. Trench C was excavated to a total length of approximately 15 feet.

Soil sampling locations were selected every 10 feet along the length of the three trenches. The trenches were visually examined and screened with an HNu and OVA. A field log of the PID readings, soil characteristics, and foreign debris encountered was kept for each trench. Soil samples were collected and screened by headspace analysis.

Following the excavation of a trench to two feet of depth, the sampling locations were screened using an HNu and OVA. Hand augers were used to collect soil samples from 0 to 6 inches and from 12 to 18 inches below the bottom of the trench. Then the trench was excavated to a depth of six feet. Sampling locations were again screened using the HNu and OVA, and samples were collected from 0 to 6 inches and from 12 to 18 inches below the bottom of the trench.

Each sample was split into two bottles and visually inspected. One of the two bottles was screened by photoionization headspace analysis. The sample jars for headspace analyses were stored from approximately one to eight hours before the headspace analyses were performed, depending on what time of day the sample was collected. This allowed sufficient time for degasing VOCs from the soil, vapor accumulation in the headspace, and equilibration of the samples. The sample jars were stored in the van or office trailer during the period between sample collection and headspace analysis.

The other jar of soil comprising each sample was saved in a chilled cooler for potential laboratory analysis, as determined from the visual inspection, field screening, and headspace results.

During the excavation of Trench B (70 to 110 feet), airborne VOCs were detected in the breathing zone at levels ranging between 2 and 7 ppm. ESC evacuated all personnel from the immediate area. On review and evaluation of the data, activities were upgraded from level D

to level C personal protection. Subsequent sampling activities in that area of the trench were monitored for conditions immediately dangerous to life and health with the HNu.

Further excavation of Trench B indicated high levels of VOCs near the end of the trench (i.e., at 110 feet from the trench origin). As previously mentioned, field screening data indicated high levels of VOCs at 110 feet from the origin of Trench B1. To reassess alternative sampling approaches that could delineate the lateral extent of the contamination, the trench was stopped at this location. Review of later laboratory data indicated that a localized area of contamination occurred at a depth of between two and four feet near this location. To verify that the contamination was localized in that area, additional sampling activities were included in an addendum to the May 1, 1990, Work Plan. The addendum called for the collection of soil samples from shallow soil borings installed to a depth of four feet using hand augers. Soil samples were collected in a line starting at the west end of Trench B and extending along a path to the west, parallel with the trench. Consistent with the Work Plan, the borings were placed every 10 feet to extend the length of the trench to a total of 150 feet (Figure 5). One additional hand-augered soil sample was collected northwest of the west end of Trench B, half way between the trench and the tree line.

In addition, a sample was collected from Trench B for characterization purposes on June 5, 1990. The sample was collected from the area inside the trench that showed the highest HNu readings and most obvious visible signs of contamination (i.e., between 80 and 110 feet from the trench origin). The actual sample location was 90 feet from the east end of the trench at an interval between 2.0 and 3.0 feet below grade. This sample was analyzed for the full HSL constituents except for VOCs. The purpose of the sample was to determine whether the soil staining observed at the west end of the trench may indicate the presence of hazardous substances other than VOCs and chromium.

Sample Identification

A numbering system was used for the samples collected from the split-spoon intervals that indicated the soil boring number and the sampling interval. The first two digits define the location of the sample boring, with the next two to four digits expressing the range of the

sampling interval. Thus, SBV2024 indicates sample location SBV20 with a sample acquired at a depth of two to four feet below grade. SBV211012 indicates sample location SBV21, with a sample acquired at a depth of 10 to 12 feet below grade.

Because of the large number of samples collected in the three trenches, a numbering system was also devised to identify the location of each sample. Each trench originated at the easternmost point (closest to the property line) and proceeded in a westerly direction. The letter identifies the trench (A, B, or C). The next two or three numerals identify the distance from the origin of the trench, the following digit identifies the depth below grade, and the final two digits indicate the sample interval collected. Thus, sample A60206 was collected from Trench A, 60 feet from the origin at a depth of 2 feet below grade, and a sample was acquired from the 0- to 6-inch interval (i.e., 2.0-2.5 feet below grade). Similarly, sample B100612 was collected from Trench B, 100 feet from the origin at a depth of 6 feet below grade, and a sample was acquired from the interval 12-18 inches below the 6-foot depth (i.e., 7.0-7.5 feet below grade). The only exception is sample B-3-2, the sample collected for HSL analysis. This sample was collected 90 feet from the origin of Trench B. The "2" indicates that the sample was collected at the 2.0- to 3.0-foot interval.

The hand-augered soil samples collected at 10-foot intervals from the west end of Trench B had a similar numbering system. The first three digits identify the distance of the sample from the origin of Trench B in feet. The fourth digit indicates the upper limit of the sampling interval in feet (i.e., the feet below grade). The last two to four digits identify the interval below the upper limit in inches. Thus, sample 1302-06 was collected 130 feet from the origin of Trench B at a depth between 2.0 and 2.5 feet below grade. Sample 1504-1218 was collected 150 feet from the origin of Trench B at a depth of between 5.0 and 5.5 feet below grade. The exception is sample 15-2-1218, which was collected from a location at a 45° angle from the west end of Trench B at a depth between 3.0 and 3.5 feet below grade.

Results

General

A total of 44 samples were collected from the 7 soil borings installed as part of this soil investigation, and 103 samples were collected from the trenches. Of the 44 samples collected from the soil borings, 15 were submitted for laboratory analysis. Of the 103 samples collected from the trenching operation, 20 were submitted for laboratory analysis. Additionally, five samples were collected from the hand-augered borings and submitted for chemical analysis according to the Work Plan addendum.

Because chromium is a naturally occurring component of native soils, concentrations found during the investigation were compared to natural background levels of chromium as reported in the literature. Shacklette and Boerngen (1984) reported the results of an extensive sampling program which included the collection of samples of soils or other regoliths, taken at a depth of approximately 20 cm (8 inches) from locations about 80 km (50 miles) apart throughout the conterminous United States. The concentration of total chromium in native soils of the eastern United States showed a geometric mean of 33 mg/kg. Samples collected from soils in Delaware indicated average total chromium concentrations ranging between 30 and 70 mg/kg.

Beyer and Cromartie (1987) reported chromium concentrations of 4.9 to 19 mg/kg (mean of 12 mg/kg) in natural soils of Maryland, Pennsylvania, and Virginia. In industrial settings, they reported the range of total chromium in soil as 9.3 to 51 mg/kg (mean of 24 mg/kg). Previous soil samples collected onsite have had chromium concentrations ranging from 1.60 mg/kg to 11.00 mg/kg. Although none of these soil samples was collected specifically for the purpose of determining background concentrations of chromium at the Millsboro site, total chromium concentrations found in soils appear to be comparable to regional background levels. Based on levels reported in the literature, total chromium concentrations found in soils above 50 mg/kg could be site related. Concentrations reported below that level may or may not be associated with prior activities at the site.

Soil Boring Investigation Behind the Building

The soil boring logs for the four new borings constructed behind the building (Figure 4) are included in Appendix B to this report. All were completed to a depth of 12 feet. The stratigraphy of the soils identified during the installation of the soil borings was consistent with findings from previous investigations at the site. Groundwater was found at a depth of between 11.0 and 11.5 feet below the surface, and the strata observed consisted of tan, fine to medium sand interspersed with a thin (i.e., a few inches thick) gray clay and sand layer at varying depths. A detailed discussion of the site geology can be found in Chapter 4 of ESC's draft R1 report, dated August 18, 1989.

Six soil samples were collected from each of the 4 borings for a total of 24 soil samples. No staining or other visual signs of contamination were observed in any of the split-spoon samples other than slight staining identified at SBV-15 from zero to eight inches. The borehole is very near the rail spur (Figure 4), and the staining is probably associated with the rail cross ties.

Each split-spoon sample was screened with either a TIP or OVA after its retrieval from the hole and separation. A headspace analysis was also performed on each of the samples with the portable TIP and an OVA. The field screening data and headspace analysis information is summarized in Table 1.

The TIP readings generally correlate with the reading obtained using the OVA. Because of the fluctuation of the TIP meter, the inherent imprecision of the instrument, and the fact that the instrument malfunctioned and could no longer be used that day, the readings obtained from the TIP were considered questionable. The field screening data indicate that VOCs may have been present at low concentrations in the vapor phase; however, no evidence of liquid phase VOCs was observed.

Nine of the 24 samples collected were selected for laboratory analysis. Additionally, four duplicate samples were submitted for chemical analysis. The laboratory results are summarized in Table 2. No volatile target compounds other than methylene chloride were

Table 1

Log of Samples Collected from Soil
 Borings Behind the Building (a)
 May 1990

Location	Depth (feet)	Headspace Analysis(b)		Field Screening(c) (ppm)
		OVA (ppm)	TIP (ppm)	
SBV-15	0-2	4.5	11.2	12
	2-4*	1.8	4.4	38
	4-6	4.4	20.2	3
	6-8*	10.0	38.3	20
	8-10	0.4	4.4	16
	10-12*	4.2	20.2	30
SBV-16	0-2	1.4	4.1	B(c)
	2-4	1.8	5.2	B
	4-6	2.6	5.6	B
	6-8*	10.0	42.1	18
	8-10*	3.2	10.2	7
	10-12	10.0	44.1	B
SBV-17	0-2	0.6	1.1	B
	2-4	2.0	6.3	10
	4-6*	4.8	20.4	10
	6-8*	4.0	8.1	15
	8-10	2.8	6.2	7
	10-12	2.0	7.1	10
SBV-18	0-2	0.2	2.0	3
	2-4	0.5	2.1	B
	4-6*	1.1	2.8	10
	6-8	3.4	4.6	B
	8-10	0.9	2.1	B
	10-12*	0.4	6.0	15

a/ B = background level; * = sample was submitted for laboratory analysis.

b/ To determine which sample locations would be sent for laboratory analysis; headspace analysis was conducted using a photovac TIP and Foxboro OVA.

c/ A Photovac TIP was used to field screen split spoon samples SBV15 0-2 and 2-4;
 Century OVA was used to field screen the remaining samples.

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Table 2

Analytical Results for Soil Boring Samples
Collected at Rear of Building (ug/kg) (a)
May 1990

Sample Number	Depth Below Grade (ft)	TCE	Chloroform	Methylene Chloride
SBV15	2-4	0.70 U	0.60 U	12
SBV15	6-8	0.70 U	0.60 U	2.9 U
SBV15 REP	6-8	0.70 U	0.60 U	2.9 U
SBV15	10-12	0.70 U	0.60 U	10.0 B
SBV16	6-8	0.70 U	0.60 U	2.9 U
SBV16 REP	6-8	0.70 U	0.60 U	2.9 U
SBV16	8-10	0.70 U	0.60 U	3.7
SBV17	4-6	0.70 U	0.60 U	2.9 U
SBV17 REP	4-6	0.70 U	0.60 U	2.9 U
SBV17	6-8	0.70 U	0.60 U	3.7 B
SBV18	4-6	0.70 U	0.60 U	6.5 B
SBV18	10-12	0.70 U	0.60 U	7.3 B
SBV18 REP	10-12	0.70 U	0.60 U	2.9 U

a/ B = analyte also found in laboratory blank.

U = compound analyzed for but not detected.

Value reported is instrument detection limit.

REP = Repeat analysis of sample.

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observed in any of the samples. These data are consistent with analytical results obtained from samples of the six soil borings previously installed in this area. A detailed description of the previous soil investigations conducted in this area can be found in Chapter 4 of ESC's August 18, 1989, draft RI report.

Investigation of the Northeast Corner

Magnetometer Survey Results

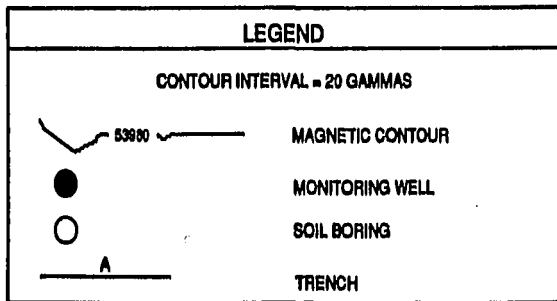
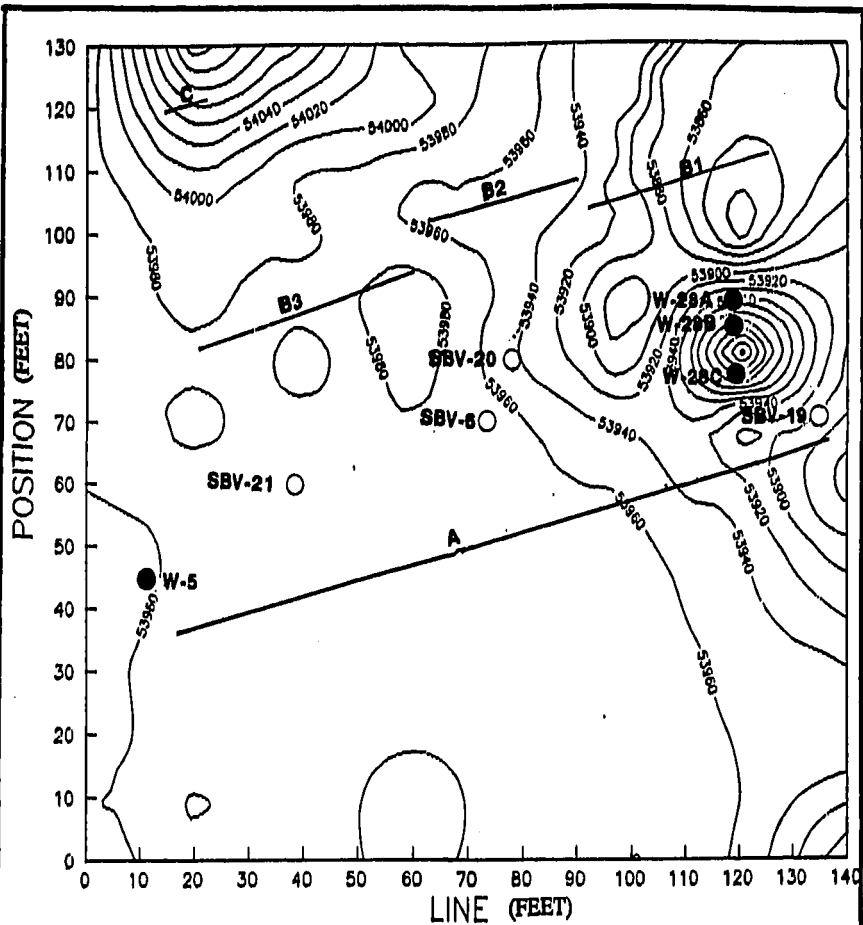
The magnetometer survey data are presented in Appendix A. Data points were selected based on a 10-foot grid. The line, position, and total field (in gammas) are plotted in Figure 6. Site features are also shown on this map. A large magnetic anomaly (about 170 gammas) occurs centered around line 120, position 80. This anomaly is due to the steel casings around the wells in well cluster 28.

Another large anomaly (202 gammas) occurs in the northwest corner of the survey area near the edge of the woods (near line 20, position 130). A small test pit, Trench C, was excavated as part of the trenching operation to identify the source of the anomaly. Trash and metallic shards found in the test pit were determined to be the source of the reading.

The magnetometer survey showed that there do not appear to be any significant ferrous metal objects in the northeast corner that would present a hazard during soil boring or trenching activities. It also did not identify any potential source of contamination or underlying obstacles that could affect subsurface investigations.

Soil Boring Results

Three soil borings were installed at the northeast corner on May 4, 1990 (Figure 5). The boring logs are included in Appendix B. Borehole numbers SBV-19 and SBV-21 were completed to a total depth of 12 feet below grade, and SBV-20 was completed to 14 feet below grade. The stratigraphy observed in SBV-19 and SBV-21 was consistent with findings from previous investigations. A stained fill was observed in SBV-20 from zero to six feet of depth and from zero to two feet in SBV-21, but observations indicated that native soils were present below these depths. Groundwater was encountered at a depth between 11.5 and 12.0 feet. The native



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Figure 6
Plot of Magnetometer Data
May 1990

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soils found in the three soil borings consist of tan, fine to medium sand interspersed with a thin (i.e., a few inches thick) clay and sand layer at varying depths. A detailed discussion of the site geology can be found in Chapter 4 of ESC's draft RI report, dated August 18, 1989.

Each split-spoon sample was field screened in a manner similar to the investigation used near the northeast corner of the building. The portable TIP indicated sporadic readings and could not be calibrated the day these boreholes were installed; therefore, the field screening and headspace analysis were performed using an OVA. The field screening data and headspace analysis information are summarized in Table 3.

There were also some difficulties encountered with the calibration of the OVA that may have affected the field screening and headspace analysis results. The OVA was calibrated in the morning before installing the three soil borings. The instrument appeared to be operating properly throughout the day; however, the instrument fluctuated between 15 and 30 ppm above the calibrated reading at the end of the day when the calibration was checked. The impact of the calibration difficulty on the results is that the VOC readings recorded may be skewed 15-30 ppm higher than actual concentration. Although this would not affect the samples selected for analysis, readings of less than 30 ppm are considered suspect.

The field screening data from SBV-20 do not correlate well with the headspace analysis or the laboratory data. The readings from the OVA during the field screening of SBV-20 were sporadic and may be questionable. Conditions in the field that may contribute to interferences include humidity, rain, and the proximity of the samples to the drill rig. The OVA may typically produce inaccurate, unstable responses when the relative humidity rises above 95%, conditions that may have been present in the field. There was high humidity on May 4, 1990, during these borings, and it began to rain at 12:00 p.m. while drilling at a depth of 10 feet in boring SBV-20.

A total of eight samples were selected from the three soil borings for VOC and total chromium analyses. A summary of the analytical data is included in Table 4.

The stained fill material observed in SBV-20 occurred to a depth of six feet below grade. Poor recovery resulted in no sample being obtained from the first two feet; however, the drill

Table 3

Log of Samples Collected from Soil
Borings At Northeast Corner of Site (a)
May 1990

Location	Depth (feet)	Headspace Analysis(b)	Field Screening(c)
		OVA (ppm)	(ppm)
SBV-19	0-2	0	7
	2-4	B	6
	4-6	B	B
	6-8	2.5	B
	8-10 *	2.5	6
	10-12 *	10	26
SBV-20	0-2	NRO	NRO
	2-4 *	100	66
	4-6	150	40
	6-8 *	30	80
	8-10	15	52
	10-12	2	15
	12-14	3	60
SBV-21	0-2 *	4	130
	2-4	4.5	2
	4-6	3	12
	6-8	1	29
	8-10	2	B
	10-12 *	2	B
	12-14 *	NRO	NRO

a/ B = background level; NRO = no reading obtained;

* = sample was submitted for laboratory analysis.

b/ To determine which sample locations would be sent for laboratory analysis; headspace analysis was conducted using a Foxboro OVA.

c/ A Century OVA was used to scan split spoon samples during drilling activities.

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Table 4

Sampling Results from Soil Borings at
the Northeast Corner of Site (ug/kg) (a)
May 1990

Sample Number	Depth Below Grade (ft)	TCE	Chloroform	TCA	Methylene Chloride	Chromium
SBV19	8-10	0.70 U	0.60 U	2.6 U	8.5	5.5
SBV19	10-12	0.70 U	0.60 U	2.6 U	2.9 U	8.7
SBV19 REP	10-12	0.70 U	0.60 U	2.6 U	2.9 U	
SBV20 (b)	2-4	380.00	38.00 U	38.0 U	330.0	54.4
SBV20	6-8	0.70 U	0.60 U	2.6 U	14.0	11.3
SBV21 (b)	0-2	200.00	38.00 U	62.0	290.0 B	118.0
SBV21	10-12	0.70 U	0.60 U	2.6 U	3.3 B	3.8
SBV21 REP D	10-12	0.70 U	0.60 U	2.6 U	2.9 U	
SBV21	12-14	0.70 U	0.60 U	2.6 U	4.5	3.2

a/ B = analyte also found in laboratory blank.

U = compound analyzed for but not detected.

Value reported is instrument detection limit.

REP = repeat analysis of sample.

D = duplicate sample.

b/ Sample diluted.

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cuttings appeared to be a gray-brown medium and fine sand and silt with a slight, oily odor. Field screening of the first three intervals (i.e., the first six feet of the borehole) indicated OVA readings ranging from 40 to 80 ppm.

Headspace analysis of samples from the two- to four-foot (SBV2024) and four- to six-foot (SBV2046) intervals showed VOC readings of 100 and 150 ppm. Samples from these two intervals were submitted for chemical analysis. The laboratory reported a value of 380 ug/kg TCE for the sample number SBV2024 (Figure 7). TCE was not reported above detection limits (i.e., 0.70 ug/kg) for the six- to eight-foot interval. No other samples from this borehole were submitted for laboratory analysis.

The headspace readings for the deeper intervals indicated that vapor phase VOCs may have been present at relatively low concentrations in the samples (Table 3). As discussed earlier, however, a VOC reading below 30 ppm may be erroneous and not indicative of the presence of vapor phase VOCs. No headspace reading above 30 ppm was observed for samples below six feet.

A stained fill material was also identified in the first two feet of soil boring SBV-21. According to the boring log, a medium to fine sand fill material ranging in color from black to gray to brown occurred at a depth between zero and two feet below grade (Appendix B). The highest OVA reading observed during the field screening of this interval was 130 ppm, and the headspace reading for this sample indicated VOCs at 4 ppm. No other readings above 30 ppm were observed during the field screening or headspace analysis for deeper sampling intervals within soil boring SBV-21.

A sample of the stained interval was submitted for laboratory analysis (SBV2102). The TCE concentration in the sample was reported as 200 ug/kg (Figure 7). Additionally, one sample (SBV211012) and a duplicate sample (SBV211012D) from the 10- to 12-foot interval were submitted for chemical analysis. The TCE concentration in these two samples was reported as below the detection limit of 0.7 ug/kg.

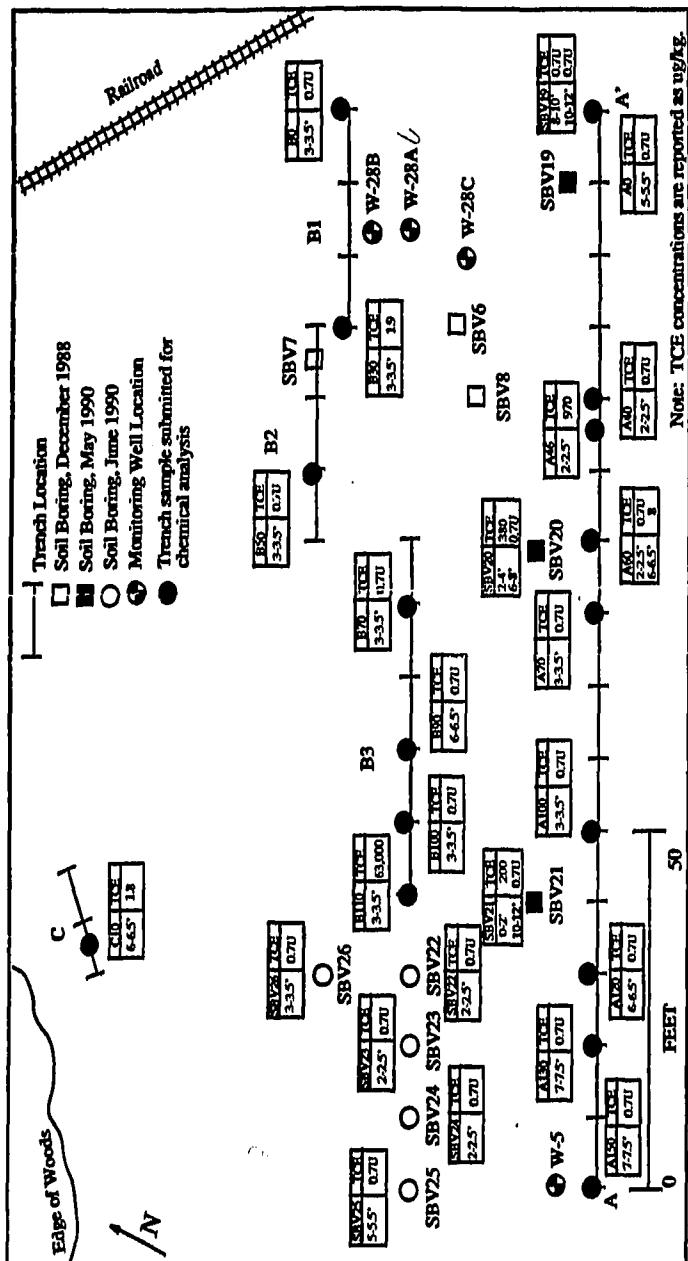


Figure 7
TCE Concentrations Found in Soil Samples
from Northeast Corner, May 1990

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Trichloroethane (TCA) was also detected in sample SBV2102 at a concentration of 62 ug/kg. The source of the TCA in the stained soil material is not known.

The stained interval was not encountered in SBV-19, and no field OVA readings were reported above 30 ppm during the installation of this borehole (Table 3). Headspace analyses of these samples did not show readings above 10 ppm for any of the samples from SBV-19. Samples of the 8- to 10-foot interval (SBV19810) and the 10- to 12-foot interval (SBV191012) were submitted for chemical analysis. No TCE was reported above the detection limit of 0.7 ug/kg for either of the two samples.

Elevated levels of methylene chloride were reported for samples SBV2024 (330 ug/kg) and SBV2102 (290 ug/kg), but these samples were analyzed at a higher dilution because of higher levels of TCE. Methylene chloride is a common laboratory solvent and was detected in laboratory and field blanks during the investigation. Review of laboratory QA/QC data indicates that none of the reported values for methylene chloride should be considered significant (Appendix C).

Total chromium values, which could be considered above background levels, were found in only two samples (SBV2024 and SBV2102). Sample SBV2024 was collected from the stained interval between two and four feet below the surface at soil boring SBV-20. The total chromium concentration in the sample was 54.4 mg/kg (Figure 8). As previously mentioned, the dark brown fill ended at a depth of six feet. One other sample from borehole number SBV-20 was analyzed for total chromium. Analysis of sample SBV2068, which was collected from a depth of between six and eight feet, showed a total chromium concentration of 11.3 mg/kg.

The sample interval from zero to two feet in SBV-21 consisted of a dark brown to medium brown sandy fill material. The analytical results for this sample showed a total chromium concentration of 118 mg/kg. Again, observations made in the field indicated that the fill material did not extend two feet below grade. Samples from two other intervals in SBV-21 were submitted for laboratory analysis. Samples SBV211012 and SBV211416, duplicates collected from the 10- to 12-foot interval, contained a total chromium concentration of 3.8 mg/kg and 3.2 mg/kg.

AR308156

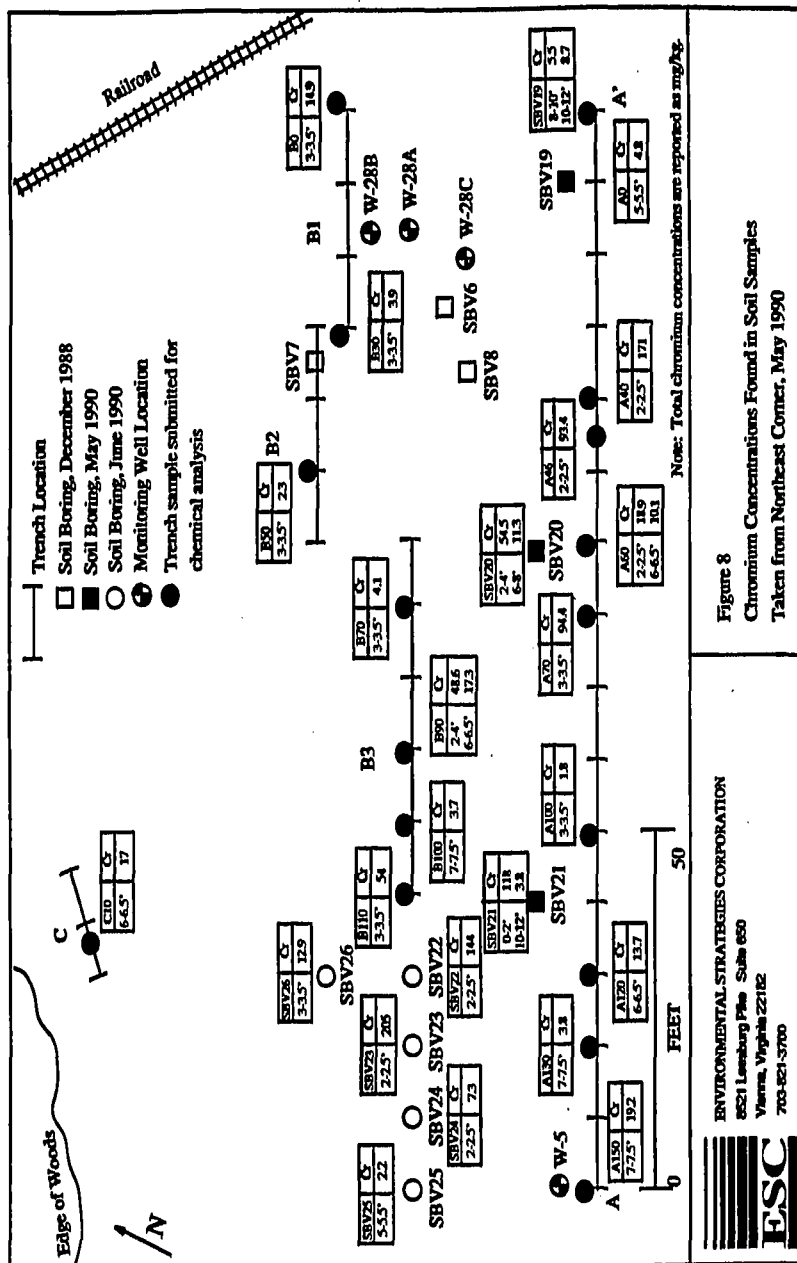


Figure 8

Chromium Concentrations Found in Soil Samples
Taken from Northeast Corner, May 1990

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AR308157

Two samples from soil boring SBV-19 were selected for laboratory analysis. These samples were collected from the 8- to 10-foot interval (SBV19810) and the 10- to 12-foot interval (SBV191012). The laboratory reported total chromium values of 5.5 mg/kg and 8.7 mg/kg (Table 4).

Trench Results

After completion of the soil borings, the trenching portion of the Work Plan was implemented. Field screening and headspace analyses conducted for Trench A are summarized in Table 5. Samples were selected for chemical analysis based on visual observations, the field and headspace readings, and protocols described in the May 1, 1990, Work Plan. Analytical data are summarized in Table 6.

The trenching indicated localized areas of fill material consisting of tree trimming refuse and other rubble (e.g., asphalt, wood scraps, cinder block) to a maximum depth of about four to five feet below grade. No drums, sludges, or other potential sources of contamination were observed. Soils occurring below that depth had characteristics consistent with those of native soils observed during previous field work at the site. Plan views of Trench A and B illustrating the location of the samples shipped for chemical analysis are shown on Figures 7 and 8.

During the construction of Trench A, a discontinuous dark gray to black layer of sand and silt material was first observed at 46 feet from the east end of the trench. Based on visual observation of the trench wall, the stratigraphy of the soil did not change, only the color. The staining, however, did not appear to be due to naturally occurring compounds. According to former site personnel, some disposal of unspecified materials was done in this area. Findings of concrete, asphalt, metal scrap, wood debris, rocks, cans, and bottles during the trenching activity support these statements. The layer occurred intermittently from 46 feet to 80 feet from the east end of the trench. The total thickness of the layer ranged from zero to six inches and occurred at a depth of about two feet below grade throughout. HNu field readings were observed above background levels at many of the locations where the staining occurred. These readings ranged from 20 to 150 ppm above background (Table 5).

Table 5

Log of Samples Collected from Trench A (a)
May 1990

Distance from Trench Origin (feet)	Depth (feet)	Sample Interval (inches)	Headspace Analysis		Field Screening
			OVA (ppm)	HNu (ppm)	HNu (ppm)
0	2	0-6	2	1	B
0	4	0-6	4	1	B
0	4	12-18 *	11	5	B
10	2	0-6	0.5	0.5	B
10	4	0-6	0.75	1	B
10	4	12-18	0.5	0.5	B
20	2	0-6	B	0.5	B
20	4	0-6	1	5	0.1
30	2	0-6	B	0.5	5
40	2	0-6 *	1	3	50
46	2	0-6 *	80	60	50
60	2	0-6	75	80	30
60 (b)	2	0-6 *	10	10	150
60	2	12-18	B	13	50
60	4	0-6	20	20	70
60	6	0-6 *	40	40	200
70	2	0-6	1.5	1.5	20
70	2	12-18 *	8	20	50
70	6	12-18	4.5	5	NRO
70	6	0-6	11	20	50
80	2	12-18	0.25	1	NRO
80	2	0-6	0.5	1	60
80	6	0-6	0.5	1.25	5
80	6	12-18	3	4.5	NRO
90	2	0-6	B	1	B
90	2	12-18	15	2	B
90	6	12-18	0.25	1.25	5
90	6	0-6	1	1.25	5

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Table 5 (Continued)

Log of Samples Collected from Trench A (a)
May 1990

Distance from Trench Origin (feet)	Depth (feet)	Sample Interval (inches)	Headspace Analysis		Field Screening
			OVA (ppm)	HNu (ppm)	HNu (ppm)
100	2	12-18 *	1.5	4	NRO
100	2	0-6	0.5	1	1
100	6	0-6	1.5	2	B
100	6	12-18	B	B	NRO
112	2	0-6	0.5	B	<1
112	2	12-18	B	B	NRO
112	6	0-6	B	B	B
112	6	12-18	B	B	NRO
120	2	0-6	B	B	B
120	2	12-18	B	B	B
120	6	12-18 *	B	B	B
120	6	0-6	B	B	B
120	10	0-6	B	B	B
130	2	0-6	B	0.2	B
130	2	12-18	B	0.1	B
130	6	12-18	B	B	B
130	6	0-6 *	B	0.2	B
140	2	12-18	0.2	B	B
140	2	0-6	B	B	B
140	6	12-18	B	B	B
140	6	0-6	B	B	B
150	2	0-6	B	B	B
150	2	12-18	B	B	B
150	6	0-6	B	B	B
150	6	12-18 *	B	B	B

a/ B = background level; NRO = no reading obtained.

* = sample was submitted for laboratory analysis.

b/ Headspace and screening were done on this interval twice; once when it was first encountered, and once during the systematic trench sampling.

AR308160

Table 6

Analytical Data for Samples Collected from Trenches (a)
May 1990

Sample Number	Distance from Origin (ft)	Sample Interval (ft)	TCE (ug/kg)	Chloroform (ug/kg)	Methylene Chloride (ug/kg)	Chromium (mg/kg)
A0412	0	5.0-5.5	0.70 U	1.10	15.0	4.8
A40206	40	2.0-2.5	0.70 U	0.60 U	2.9 U	171.0
A40206 REP	40	2.0-2.5	0.70 U	0.60 U	4.1 B	
A46206	46	2.0-2.5	970.00	38.00 U	190.0 B	93.4
A60206	60	2.0-2.5	0.70 U	0.60 U	5.6 B	18.9
A60606	60	6.0-6.5	8.00	0.60 U	8.0 B	10.1
A70212	70	3.0-3.5	0.70 U	0.60 U	2.9 U	94.4
A70212 REP	70	3.0-3.5	0.70 U	0.60 U	2.9 U	
A100212	100	3.0-3.5	0.70 U	0.60 U	3.5 B	1.8 B
A120612	120	7.0-7.5	0.70 U	0.60 U	2.9 U	13.7
A120612 REP	120	7.0-7.5	0.70 U	0.60 U	2.9 U	
A130606	130	6.0-6.5	0.70 U	1.40	16.0 B	3.8
A150612	150	7.0-7.5	0.70 U	0.78	12.0 B	19.2
B0212	0	3.0-3.5	0.70 U	0.60 U	4.6 B	14.9
B30212	30	3.0-3.5	1.10	0.60 U	3.3 B	3.9
B30212 REP	30	3.0-3.5	1.90	0.60 U	3.8 B	
B50212	50	3.0-3.5	0.70 U	0.60 U	8.3 B	2.3
B70212	70	3.0-3.5	0.70 U	0.60 U	2.9 U	4.1
B70212 REP	70	3.0-3.5	0.70 U	0.60 U	2.9 U	
B90606	90	6.0-6.5	0.70 U	0.70	12.0 B	17.3
B100612	100	7.0-7.5	0.70 U	0.60 U	2.9 U	3.7
B100612 REP	100	7.0-7.5	0.70 U	0.60 U	2.9 U	
B100613(b)	100	7.0-7.5	0.70 U	1.50	16.0	4.0
B110212	110	3.0-3.5	63,000.00	750.00 U	6,000.0	54.0
C10606	10	6.0-6.5	1.80	0.60 U	16.0	17.0

a/ B = analyte also found in laboratory blank.

U = compound analyzed for but not detected. Value reported is instrument detection limit.

REP = repeat analysis of sample.

b/ B100613 is a duplicate of sample B6100612

AR308161

Field readings taken with the HNu of the layer occurring at 46 feet from the origin of Trench A indicated a reading of 50 ppm (Table 7). Chemical data for a sample of the stained material collected from a depth of between 2.0 and 2.5 feet at approximately 46 feet from the east end of the trench (A46206) had a TCE concentration of 970 ug/kg.

The highest field readings observed for Trench A occurred at 60 feet from the east end of the trench. The field readings at this location were recorded as 150 ppm between 2.0 and 2.5 feet below grade, 50 ppm between 3.0 and 3.5 feet below grade, 70 ppm between 4.0 and 4.5 feet below grade, and 200 ppm between 6.0 and 6.5 feet below grade (Table 5). The headspace analysis of these samples ranged from 10 to 40 ppm. A sample was submitted for chemical analysis from the 2.0- to 2.5-foot interval (A60206) and the 6.0 to 6.5 foot interval (A60606). TCE was not reported above detection limits of 0.7 ug/kg for sample A60206. The highest field reading recorded for Trench A (200 ppm) was for sample A60606. No staining of the sample or other visible evidence of contamination was observed at this location; however, chemical analysis of sample A60606 indicated a TCE concentration of 8.0 ug/kg.

Trench B was split into three staggered sections (Figure 5). The first section was 30 feet long, extending from 0 to 30 feet east of the origin. No debris or stained soil was encountered in this trench segment, and no HNu readings above background were observed during field screening. However, headspace analysis of a sample collected at a depth of 3.0-4.0 feet at 30 feet west of the trench origin indicated an HNu reading of 12 ppm. Chemical analysis of this sample (B30212) showed a TCE concentration of 1.9 ug/kg.

The second segment of trench B was offset five feet north of the end of the first segment (Figure 5) and extended an additional 30 feet west of the origin. Tree fragments, discarded wood, chicken wire, and other scrap material were observed from 25 to 30 feet along this segment (55-60 feet west of the origin). Intermittent soil staining was also evident at the 60-foot mark. Analysis of a soil sample at a depth of 3.0-3.5 feet at station 50 (B50212), just east of the stained soil area, indicated an absence of TCE (Table 6, Figure 7).

The third segment of trench B was offset 15 feet south of the end of the second segment (beginning 60 feet west of the origin of the trench) and extended an additional 50 feet west (to

Table 7

Log of Samples Collected from Trenches B and C (a)
May 1990

Distance from Trench Origin (feet)	Depth (feet)	Sample Interval (inches)	Headspace Analysis		Field Screening
			OVA (ppm)	HNU (ppm)	HNU (ppm)
0	2	0-6	B	B	B
0	2	12-18 *	B	B	B
0	6	0-6	0.2	0.2	B
0	6	12-18	B	B	B
10	2	0-6	B	B	<1
10	2	12-18	B	B	B
10	6	0-6	B	B	B
10	6	12-18	B	B	B
20	2	0-6	B	B	B
20	2	12-18	1.5	3	B
20	6	0-6	0.25	B	B
20	6	12-18	B	0.25	B
30	2	0-6	B	B	B
30	2	12-18 *	6	12	B
30	6	0-6	125	0.5	B
30	6	12-18	125	0.75	B
40	2	0-6	B	B	B
40	2	12-18	B	B	B
40	6	0-6	125	3	B
40	6	12-18	B	B	B
50	2	0-6	B	B	B
50	2	12-18 *	B	B	B
50	6	0-6	2	2	5
50	6	0-6	1.5	2	NRO
60	2	0-6	0.25	0.75	B
60	2	12-18	0.25	B	B
60	6	0-6	0.5	2	15
60	6	12-18	B	0.25	NRO
70	2	0-6	B	B	B
70	2	12-18 *	B	B	B
70	6	0-6	6	16	20
70	6	12-18	B	1	NRO
80	2	0-6	10	20	NRO
80	2	12-18	45	50	NRO
80	6	0-6	60	20	NRO
83-86	2	Surface *	200	180	NRO
86-90	2	Surface *	300	120	NRO
90	2	0-6	19	10	NRO

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Table 7 (Continued)

Log of Samples Collected from Trenches B and C
May 1990

Distance from Trench Origin (feet)	Depth (feet)	Sample Interval (inches)	Headspace Analysis		Field Screening
			OVA (ppm)	HNu (ppm)	HNU (ppm)
90	2	12-18	1000	200	NRO
90	6	0-6 *	60	20	NRO
100	2	12-18	1000	600	70
100	2	0-6	75	40	NRO
100	6	0-6	35	30	15
110	2	0-6	200	130	NRO
110	2	12-18 *	650	400	300
110	6	0-6	35	30	NRO
110	6	Surface	350	300	NRO
C10	2	0-6	20	15	NRO
C10	6	0-6 *	B	B	NRO

a/ B = background level; NRO = no reading obtained; * = sample was submitted for laboratory analysis

AR308164

110 feet west of the trench origin). Concrete and asphalt were observed between 75 and 80 feet, and stained soils ranging in depth from 0.5 to 4.5 feet were encountered along the entire third segment, from 60 feet to 110 feet west of the trench origin. Field screening HNu readings ranged from 15 to 70 ppm over the interval from 60 to 80 feet. From 80 feet to the end of the trench at 110 feet, field screening HNu readings ranged from 50 to 500 ppm, and headspace analyses ranged from 40 to 600 ppm. A heavy organic odor was also observed in the interval from 80 to 110 feet from the origin.

Because visual observation, field screening, and headspace analysis data indicated that the stained layer was contaminated with VOCs, only one sample (B11212) was collected to characterize the stained soil. Additional samples were collected below the stained soil horizon, at a depth of six feet, to define the extent of the soil contamination and to determine if VOCs were leaching into underlying soils and groundwater. TCE was not detected in the soil samples collected below the stained layer.

The field HNu readings and visual inspection indicated that the area with the highest potential VOC contamination was at about 110 feet from the east end of the trench. A layer of heavily stained material starting at about 0.5 foot below the surface and extending in places from 4.0 to 4.5 feet of depth was observed in this location. Observation of the trench wall indicated that the heaviest staining ended at 3.5 feet but that some staining had migrated in places to 4.5 feet. HNu readings of the open trench at this location were recorded as 300 ppm above background. The trench was excavated down to 10 feet in this location to determine the vertical extent of the contamination. Sample B110212 was collected from this location at a depth between 3.0 and 3.5 feet to characterize the stained soil layer. Headspace analysis of the sample showed HNu readings of 400 ppm. The TCE concentration for this sample determined by laboratory analysis was reported as 63,000 ug/kg.

HNu readings indicated that vapor phase VOCs occurred to a depth of 6.0 feet. Headspace analysis of a sample taken at 6.0 feet below grade showed an HNu reading of 300 ppm; however, headspace analysis of a sample taken from 6.5 feet of depth had showed an HNu reading of 30 ppm. Beyond 6.5 feet of depth all HNu readings were at background levels. A

clay layer was observed at approximately 10 feet of depth. The approved May 1990 work plan stipulated that no clay layers would be penetrated. Therefore, the test pit was stopped at 10 feet below grade.

Trench C was installed as a test pit, approximately 15 feet in length, to investigate the magnetic anomaly observed during the magnetometer survey. Observations during the installation of the trench indicated that this area had been used as a trash disposal area in the past. Debris found in the pit included metal scraps, discarded soft drink cans, and glass bottles. No evidence of a source of contamination was identified in the test pit. No visible evidence of contamination, such as the dark staining identified in the other trenches, was observed in the test pit.

A sample was collected from the test pit at 2.0 and 6.0 feet below grade. Headspace analysis of the deeper sample indicated that no VOCs were present above background. The sample collected from 2.0 feet showed an HNu reading of 15 ppm. The sample from 6.0 feet of depth was submitted for chemical analysis (sample C10606). The laboratory results showed a TCE concentration of 1.8 ug/kg (Table 6).

The quality assurance and quality control (QA/QC) review of the data generated by the chemical analyses of the samples collected during the trenching activities indicated that no volatile target compounds were detected in samples A120612, A40206, B100612, and B70212 and that methylene chloride was the only compound detected in the samples A100212, A60206, B50212, and B0212. Low levels of methylene chloride were reported in samples B100613, B90606, A130606, A150612, and A0412 along with levels less than 5 ug/kg of chloroform and in samples A60606, B30212, and C106060 along with low levels of TCE. Apparent high concentrations of methylene chloride were reported for sample numbers A46206 and B110212, but this is due to the high dilution factors used for the analyses because of the presence of elevated levels of TCE in the samples. The QA/QC data for this investigation indicated that methylene chloride occurred in laboratory and field blanks. Therefore, none of the reported values for methylene chloride should be considered significant.

Only four samples from Trench A and Trench B (A40206, A46206, A70212, and B110212) contained levels of total chromium that could be considered above background (Table 6). These samples were all collected at less than 3.5 feet below grade. There was no apparent correlation between levels of VOCs and chromium in the analyses performed. The total chromium concentrations for samples A40206 and A70212 were 171 and 94.4 mg/kg versus a TCE concentration below detection limits for these two samples. Conversely, samples A46206 and B110212 contained total chromium concentrations of 93.4 and 54.0 mg/kg and TCE concentrations of 940 ug/kg and 63,000 ug/kg.

The field blanks and the trip blanks collected during the trenching operation were analyzed for EPA method 601 VOCs. Methylene chloride was detected at less than 20 ug/l in both samples but was also present in the method blank. The reported values for the samples should be ignored. A trace level (0.49 ug/l) of TCE was detected in the field blank collected on May 9, 1990. All reported quality control results were within acceptance limits.

The May 1, 1990, Work Plan had indicated that Trench B was to be constructed to a total length of 150 feet. However, the trench was completed to only 110 feet because high levels of contaminants were encountered, resulting in a reassessment of continuing sampling plans. All the soil borings and trenching activities conducted in this area had indicated that the staining occurring in the northeast corner was restricted to a depth of less than five feet. Additionally, the trenching activities verified that no buried drums or sludge was present in this area. Therefore, the investigation could be continued through the collection of shallow soil samples. To complete the delineation of the contamination detected in Trench B, additional sampling was conducted with hand augers on June 5, 1990.

Hand-augered soil borings were installed in a line from the west end of Trench B every 10 feet (Figure 5). As previously discussed, an additional boring was installed northwest of the end of the trench. Visual examination of the soil samples indicated that the staining continued approximately 30 feet from the end of the trench (i.e., 140 feet from the origin of Trench B). The staining was at about the same depth and gradually decreased in thickness from the 110-foot location to the boring placed at 140 feet. No staining was observed at the 150-foot boring.

Headspace analyses of the samples indicate that vapor phase VOCs correlate with the staining, and as with the staining, the vapor phase VOCs decreased to background as the samples were collected farther from the end of Trench B (Table 8). The HNu readings also decreased with depth. Additionally, no staining was observed in the northwest sampling location, and HNu readings for samples from this location were at background. A summary of the data is provided in Table 9. Review of the data illustrates that no target VOC compounds other than methylene chloride were reported above detection limits. The methylene chloride was found in the laboratory blank and probably results from laboratory contamination.

Total chromium values were indicated in two of the hand-augered samples, which are above the previously identified background levels (Table 9). The sample collected 10 feet from the end of Trench B (i.e., 120 feet from its origin) contained a total chromium concentration of 144 mg/kg. Sample B120206 was collected 2.0 to 2.5 feet below grade. The sample collected 130 feet from the origin of Trench B (B130206) contained a total chromium concentration of 205 mg/kg. Sample B130206 was also collected between 2.0 and 2.5 feet below grade. No total chromium levels above background concentrations were reported in any of the other hand-augered samples (Table 10).

One additional sample was collected from the highly stained interval on June 5, 1990, the day the hand-augered samples were taken. The results for this sample (B-3-2) are summarized in Table 10. Sample B-3-2 was taken at a location 90 feet from the origin of Trench B, between 2.0 and 3.0 feet below grade, and was analyzed for the full HSL constituents, excluding VOCs.

Chromium was the only metal that was reported at a significant concentration. The analyses indicated a chromium concentration of 48.6 mg/kg. All other metals were found at concentrations below 10 mg/kg. The only organic compounds reported above detection limits were dieldrin (2.8 ug/kg), nitrobenzene (800 ug/kg), and naphthalene (900 ug/kg). The site is located in an area of agricultural land use and is adjacent to a farm field. Dieldrin is a commonly used insecticide. The levels found in sample B-3-2 probably represent background

Table 8

Log of Samples Collected from Hand Augered (a)
 Borings Around Trench B
 June 1990

Distance from Trench B Origin (feet)	Depth (feet)	Sample Interval (inches)	Headspace Analysis HNu (ppm)	Field Screening HNu (ppm)
120 *	2	0-6	25	20
120	2	12-18	22	NRO
120	4	0-6	12	5
120	4	12-18	12	6
130 *	2	0-6	21	20
130	2	12-18	3	5
130	4	0-6	3	3
130	4	12-18	1	B
140 *	2	0-6	22	15
140	2	12-18	10	5
140	4	0-6	4	B
140	4	12-18	B	B
150	2	0-6	B	B
150	2	12-18	B	B
150	4	0-6	B	B
150 *	4	12-18	B	B
150 (b)*	4	12-18	B	B
15	2	0-6	B	B
15 *	2	12-18	1	B

a/ NRO = no reading obtained, B = background level,

* = sample submitted for laboratory analysis.

b/ Duplicate sample.

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Table 9
Analytical Data for Hand Augered Samples Around Trench B (a)
June 1990

Sample Number	Distance from Origin of Trench B (ft)	Depth Below Grade (ft)	TCE (ug/kg)	Chloroform (ug/kg)	Methylene Chloride (ug/kg)	Chromium (mg/kg)
1202-6	120	2.0-2.5	0.70 U	0.60 U	4.9 B	144.0
1302-06	130	2.0-2.5	0.70 U	0.60 U	5.1	205.0
1302-06 REP	130	2.0-2.5	0.70 U	0.60 U	10.0 B	
15-2-1218(b)		3.0-3.5	0.70 U	0.60 U	11.0 B	12.9
1402-06	140	2.0-2.5	0.70 U	0.60 U	23.0 B	7.3
1402-06 REP	140	2.0-2.5	0.70 U	0.60 U	11.0 B	
1504-1218	150	5.0-5.5	0.70 U	0.60 U	18.0 B	2.2
1506-1218(c)	150	5.0-5.5	0.70 U	0.60 U	9.2 B	2.2

a/ B = analyte also found in laboratory blank.

U = compound analyzed for but not detected.

Value reported is instrument detection limit.

REP = repeat analysis of sample.

b/ Sample taken at distance of 15 feet perpendicular to line of trench and other samples.

c/ Duplicate of 1504-1218.

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Table 10

Analysis of Sample B-3-2 for Hazardous Substance List Compounds (Except VOCs)

June 1990

<u>Compound</u>	<u>Level</u>
Metals (mg/kg)	
Antimony	3.9 U
Arsenic	0.33 B
Beryllium	0.10 U
Cadmium	0.50 U
Chromium	48.6
Copper	6.4
Lead	8.0
Mercury	0.10 U
Nickel	7.5
Selenium	0.20 U
Silver	0.40 U
Thallium	0.30 U
Zinc	6.6
Cyanides (mg/kg)	
Cyanide	0.10 U
Pesticides and PCBs (ug/kg)	
4,4'-DDD	3.5 U
4,4'-DDE	3.5 U
4,4'-DDT	3.5 U
Aldrin	1.0 U
Chlordane	4.0 U
Dieldrin	2.8
Endosulfan I	1.5 U
Endosulfan II	3.5 U
Endosulfan sulfate	2.0 U
Endrin	2.5 U
Endrin aldehyde	1.0 U
Heptachlor	1.0 U
Heptachlor epoxide	1.0 U
Kepone	1.0 U
Methoxychlor	3.5 U
PCB-1016	20 U
PCB-1221	20 U
PCB-1232	20 U
PCB-1242	20 U
PCB-1248	20 U
PCB-1254	20 U
PCB-1260	20 U
Toxaphene	20 U

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Table 10 (Continued)

Analysis of Sample B-3-2 for Hazardous Substance List Compounds (Except VOCs)
June 1990

<u>Compound</u>	<u>Level</u>
Alpha-BHC	1.0 U
Beta-BHC	1.0 U
Delta-BHC	1.0 U
Gamma-BHC	1.0 U
Phenols (mg/kg)	
Total phenols	0.10 U
Semivolatiles (ug/kg)	
N-Nitrosodimethylamine	370 U
Phenol	370 U
bis(2-Chloroethyl)ether	730 U
2-Chlorophenol	370 U
1,3-Dichlorobenzene	370 U
1,4-Dichlorobenzene	370 U
1,2-Dichlorobenzene	370 U
bis(2-Chloroisopropyl)ether	370 U
N-Nitroso-di-n-propylamine	370 U
Hexachloroethane	370 U
Nitrobenzene	800
Isophorone	370 U
2-Nitrophenol	370 U
2,4-Dimethylphenol	370 U
bis(2-Chloroethoxy)methane	370 U
2,4-Dichlorophenol	370 U
1,2,4-Trichlorobenzene	370 U
Naphthalene	900
Hexachlorobutadiene	370 U
4-Chloro-3-Methylphenol	370 U
Hexachlorocyclopentadiene	370 U
2,4,6-Trichlorophenol	730 U
2-Chloronaphthalene	370 U
Dimethyl phthalate	370 U
Acenaphthylene	370 U
2,6-Dinitrotoluene	37 J
Acenaphthene	370 U
2,4-Dinitrophenol	1400 U
4-Dinitrophenol	370 U
2,4-Dinitrotoluene	370 U
Diethylphthalate	370 U
4-Chlorophenyl-phenylether	370 U

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Table 10 (Continued)

Analysis of Sample B-3-2 for Hazardous Substance List Compounds (Except VOCs)
June 1990

<u>Compound</u>	<u>Level</u>
Semiivolatiles (ug/kg)	
Fluorene	370 U
1,2-Diphenylhydrazine	370 U
4,6-Dinitro-2-methylphenol	1100 U
N-Nitrosodiphenylamines(1)	60 J
4-Bromophenyl-phenylether	370 U
Hexachlorobenzene	370 U
Pentachlorophenol	730 U
Phenanthrene	74 J
Anthracene	370 U
Di-n-Butylphthalate	370 U
Fluoranthene	370 U
Benzidine	370 U
Pyrene	370 U
Butylbenzylphthalate	370 U
3,3'-Dichlorobenzidine	370 U
Benzo(a)anthracene	370 U
Chrysene	370 U
bis(2-Ethylhexyl)phthalate	290 J
Di-n-octyl phthalate	370 U
Benzo(b)fluoranthene	370 U
Benzo(k)fluoranthene	370 U
Benzo(a)pyrene	370 U
Indeno(1,2,3-cd)pyrene	370 U
Dibenz(a,h)anthracene	370 U
Benzo(g,h,i)perylene	370 U

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levels. The naphthalene could be from asphalt, seen in the trenches, or from the dark stained soil.

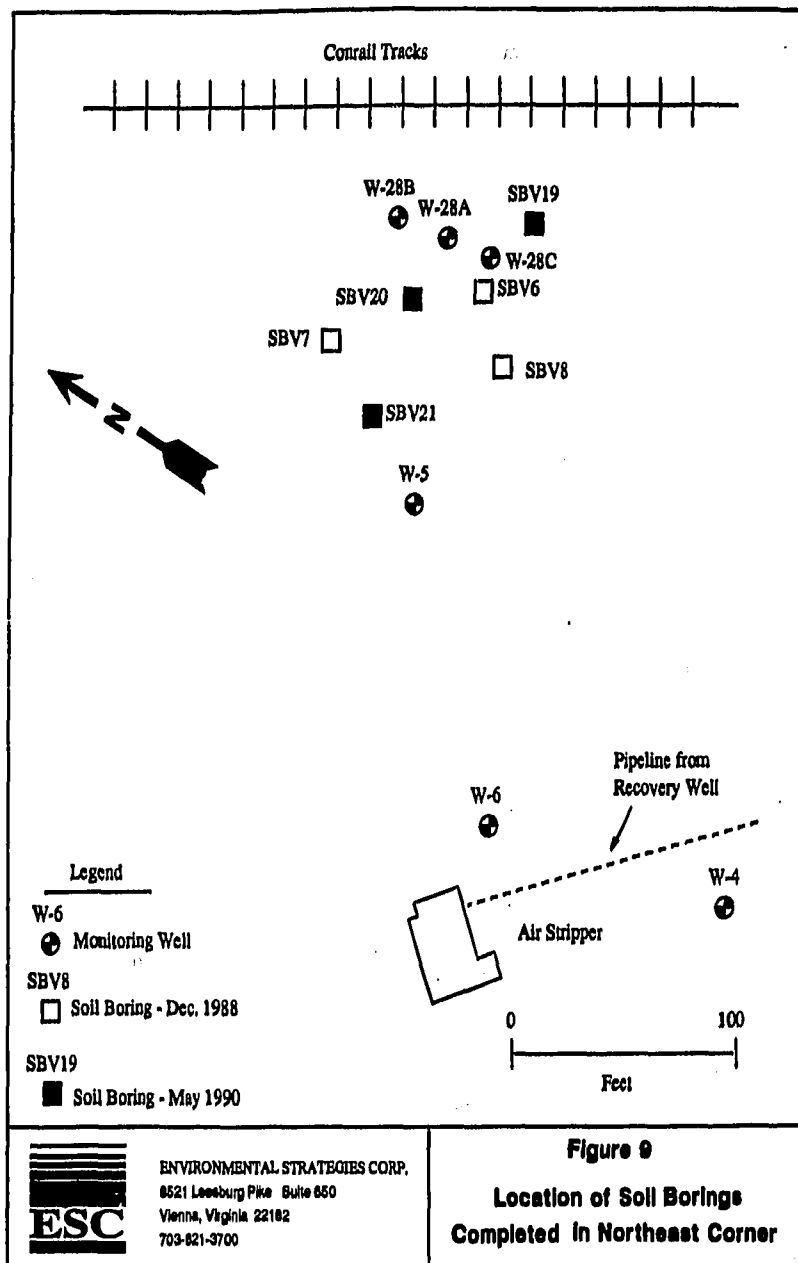
Pertinent Historical Data

A detailed description of the earlier investigations performed in the northeast corner can be found in Chapter 4 of the August 18, 1989, draft RI report; however, it is important to include some relevant information in this report. Three soil borings and a monitoring well cluster were installed in the area during the RI investigation. The soil borings were installed in December 1988, and the well cluster was sampled during April 1989 (Figure 9).

During the installation of borings SBV-6, SBV-7, and SBV-8, some staining was observed in SBV-8 but not in the other two soil borings. The staining occurred in the two- to four-foot interval. This is consistent with observations of intermittent staining observed during the construction of the trenches. Samples collected from the three soil borings were analyzed for EPA method 601 VOCs. TCE was found above the detection limit in only one sample. A sample of the two- to four-foot depth interval in SBV-8 showed a TCE concentration of 17 ug/kg.

Chemical analyses of the groundwater samples collected from the well cluster installed in the area (W28-A, B, and C) indicated that total chromium and hexavalent chromium were not present at concentrations above the detection limits of 5 ppb and 10 ppb. The analytical data also showed that TCE was present in the sample from the shallow well (W28-A) at a concentration of 0.22 ug/l (ppb) but not in samples from the deeper wells.

Data from this soil investigation indicate that TCE was present in only 2 of 10 samples beneath the stained soil layer, collected at depths of 6.0-7.5 feet, and the maximum value observed below the stained soil horizon was 8.00 ug/kg. Chromium concentrations within the stained soil horizon average 103 ug/kg (for four samples), compared to 5.7 ug/kg (for six samples) for soils away from the stained soil horizon. Soil below the stained soil horizon has chromium concentrations averaging 11.5 ug/kg (for nine samples).



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These data indicate that TCE and chromium contamination of soils in this area is confined to the stained soil stratum occurring at depths of 0.5-4.5 feet below the ground surface.

Conclusions

The soil borings installed behind the building verified earlier data that indicated that no source of TCE occurs in the vadose zone at that location. TCE was not reported above detection limits in any of the samples collected in this area, indicating that any TCE that may have been present in the vadose zone in the past has migrated to the water table. Therefore, no further investigation of the soils in this area is warranted.

Field activities associated with the soil borings and trenches installed in the northeast corner of the site have detected a zone of contamination extending from approximately 0.5 feet to 3.5 feet below grade. This layer consists of a dark gray-brown medium and fine sand and silt. The zone is located within the 1,000-ppm contour established by the results of the soil gas survey (Figure 2). The data indicate that the areal extent of the contamination is limited to an area of approximately 2,400 sq ft.

Based on the historical, physical, and chemical data obtained from the soils investigations in the northeast corner of the site, it appears that the TCE and chromium contamination was deposited here by burial of a small volume of unspecified wastes. However, the contamination has been largely retained within the waste horizon and has not migrated to underlying soils and groundwater.

Based on the data collected during the magnetometer survey, there are no significant ferrous metal objects in the northeast corner such as drums or other containers that could be potential sources of contamination. Additionally, no sludge or other identifiable potential sources of contamination were found by the soil borings or trenching operation in the area.

Samples collected in the northeast corner had TCE concentrations of less than 1 mg/kg in all but one location. The stained interval, running roughly 60 feet from the east end of Trench B (i.e., the trench origin) to the west end (Figure 5) and occurring at a depth between 0.5 and 3.5 feet, showed the highest levels of TCE contamination. The sample collected from the stained interval at the west end of Trench B had a TCE concentration of 63 mg/kg. The sampling results and field and headspace readings taken within this area of Trench B indicate

that TCE may be above 1 mg/kg within this limited area. Analytical results for soil samples collected six feet below the surface at this location indicated TCE concentrations below the detection limit (i.e., 0.7 ug/kg).

The analytical data also demonstrated that chromium concentrations above background levels occur within the stained intervals in a few locations. As with the TCE, the results of this investigation along with pertinent historical data discussed in this report indicate that the chromium has been largely held within the stained soil stratum. The highest total chromium values were found in soil boring SBV21 (118 mg/kg), SMB22 (144 mg/kg), SBV23 (205 mg/kg), and 40 feet from the east end of Trench A (171 mg/kg). The four other samples exhibiting total chromium concentrations above background levels were all below 100 mg/kg. The elevated chromium levels may or may not be associated with the elevated TCE values.

Chromium was not reported at levels above 20 mg/kg in any of the samples collected below four feet. Additionally, groundwater samples collected from the well cluster at this location show total chromium concentrations below detection limits. The data collected as part of this investigation as well as previous investigations demonstrate that the chromium contamination occurring in the soils underlying the northeast corner of the site is limited to small portions of the stained interval found there. No groundwater contamination has been associated with the elevated chromium concentrations found in the soil.

A preliminary assessment of the potential risks presented by the highest TCE and chromium concentrations found in soil samples from the site is included in Appendix D. The risks will be evaluated in greater detail in the final RI report; however, this preliminary risk assessment provides a conservative evaluation of those risks. A TCE concentration in soil of 63 mg/kg and a total chromium concentration in soil of 205 mg/kg were used.

The risk assessment estimates excess lifetime cancer risk (upper bound) associated with inadvertent ingestion of soils containing 63 mg/kg of TCE as 7×10^{-7} , less than the U.S. Environmental Protection Agency's (EPA's) target risk range of 10^{-6} to 10^{-4} . Dermal exposure to soils is estimated to present an upper bound cancer risk of 8×10^{-6} , within the EPA's target risk range. Ingestion exposure to chromium is estimated to be less than the reference dose for

hexavalent chromium (hazard index = 0.3), indicating that there is negligible probability of systemic toxicity.

The area of the TCE concentrations of concern is identified in Figure 10. The contamination is limited to four feet of depth and is confined by the locations of shallow soil boring SBV-22 to the west, soil boring SBV-7 to the north and east, and soil borings SBV-21 and SBV-20 to the south. Soil samples collected in Trench B and Trench C also define the limit of TCE contamination in the soil to the east and north. Assuming that the concentration of TCE in the stained interval is above 1 mg/kg within the area defined by these bordering sample locations, the areal extent of the TCE-contaminated soil potentially occurs in an area approximately 30 feet wide by 50 feet long. If the stained interval is located to a depth of 4 feet and assuming that the area is roughly rectangular in shape, the total volume of contaminated soil would be approximately 225 cu yd.

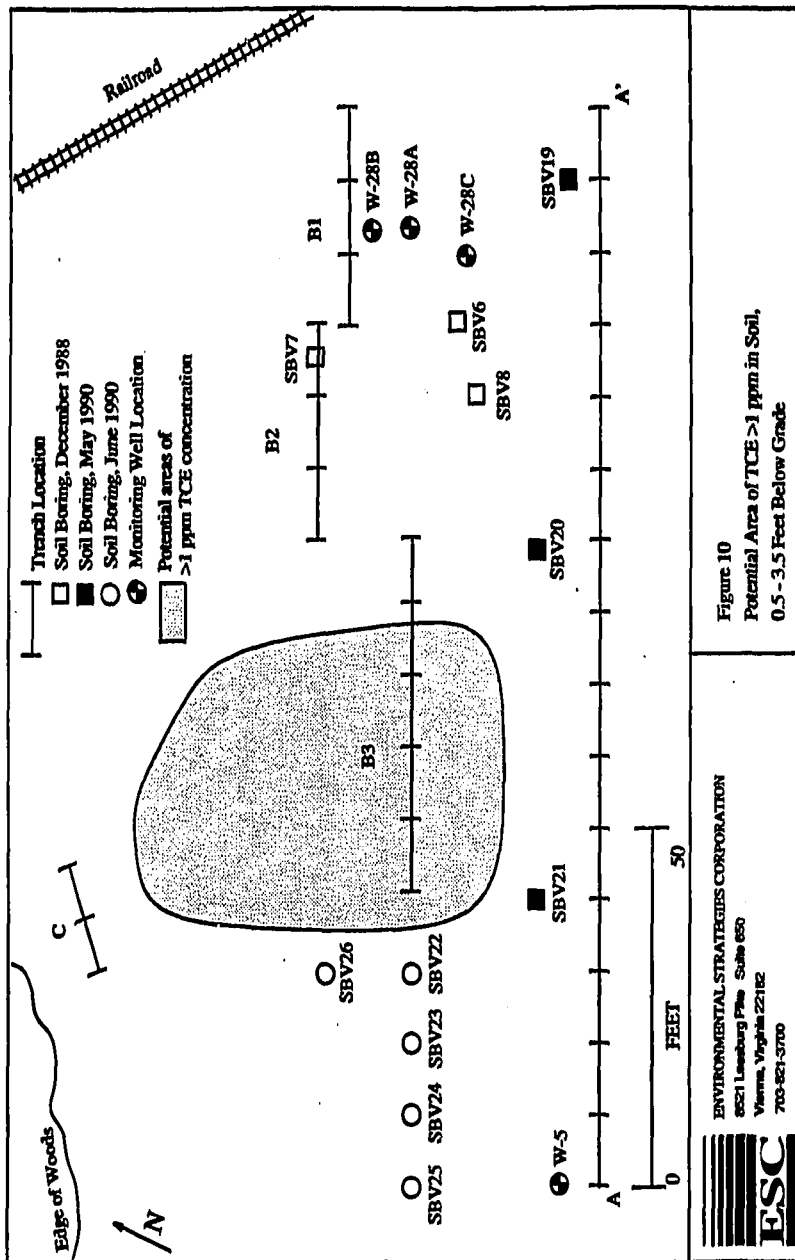


Figure 10
Potential Area of TCE >1 ppm in Soil,
0.5 - 3.5 Feet Below Grade

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703-821-3700



AR308180

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Appendix A - Magnetometer data survey

AR308181a

#1

Site Name NCR Millbrook By L. Henning & D. Sandhaus
 Location _____ Date 5-1-90

TIME	LINE #	POSITION	TOTAL FIELD	VERTICAL	ERROR	TOTAL FIELD	CORRECTED
REFERENCE		FIELD	CHECK	CHAMBER		CONNECTION	TOTAL FIELD
10:41	BS		53940.6				
10:41	BS		53941.7				
10:42	D	0	53946.0				
10:43	D	0	53945.3				
10:44	NS		54535.3		1000 2.5A		
	Initialize	Mag for Survey					
11:01	D	0	53947.2		NO LF		
11:02	D	0	53947.1		OK		
11:03	BS		53944.2		OK		
11:04	D	20	53948.2		OK		

2607

Reference field value: 53900.0
 084 3100

MAGNETIC SURVEY DATA SHEET

FIGURE 9

AR308192

#2

Site Name NCL By _____
 Location _____ Date 5-1-90

TIME	LINE #	POSTION	TOTAL FIELD	VERTICAL GRADIENT	ERROR	TOTAL FIELD CORRECTION	CORRECTED TOTAL FIELD
11:06	0	40	53947.7				
11:07	0	60	53947.4				
11:07	0	80	53961.9				
11:07	0	100	53962.9				
11:07	0	120	53972.8				
11:09	20	120	54076.8				
11:11	20	120	54087.8				
11:11	20	100	53984.0				
11:12	20	80	53972.6				
11:12	20	60	53964.9				
11:12	20	40	53966.3				
11:13	20	20	53967.7				

MAGNETIC SURVEY DATA SHEET

FIGURE 9

AR300183

#3

Site Name _____ By _____
 Location _____ Date _____

TIME	LINE #	POSITION	TOTAL FIELD	VERTICAL GRADIENT	ERROR	TOTAL FIELD CORRECTION	CORRECTED TOTAL FIELD
11:14	20	0	53925.4				
11:14	85		53950.6				
11:15	40	0	53966.4				
11:15	40	20	53960.2				
11:16	40	40	53963.8				
11:16	40	60	53969.1				
11:17	40	80	53945.6				
11:17	40	100	53984.5				
11:18	40	120	54025.4				
11:19	60	120	54012.3				
11:20	60	100	53954.2				
11:20	60	80	53987.5				

very faint
signature

MAGNETIC SURVEY DATA SHEET

FIGURE 9

AR300184

4

Site Name _____

By _____

Location _____

Date _____

TIME	LINE #	POSITION	TOTAL FIELD	VERTICAL GRADIENT	ERROR	TOTAL FIELD CORRECTION	CORRECTED TOTAL FIELD
11:21	60	60	5375.4				
11:21	60	40	5374.5				
11:22	60	20	5372.9				
11:22	60	0	5378.4				
11:22	85		5395.6				
11:23	80	0	5396.8				
11:23	80	20	5397.2				
11:24	80	40	5394.5				
11:24	80	60	5396.2				
11:25	80	80	5392.1				
11:25	80	100	53943.3				
11:24	100	100	53925.9				

MAGNETIC SURVEY DATA SHEET

FIGURE 9

AR308185

#5

Site Name NCR By _____ Date _____
 Location _____

TIME	LINE #	POSITION	TOTAL FIELD	VERTICAL GRADIENT	ERROR	TOTAL FIELD CORRECTION	CORRECTED TOTAL FIELD
11:27	100	80	53875.9				
11:27	100	60	53956.1				
11:28	100	40	53970.2				
11:29	100	20	53975.3				
11:29	100	0	53980.0				
11:30	BS		53952.0				
11:30	120	0	53956.2				
11:31	120	20	53956.1				
11:31	120	40	53945.0				
11:32	120	60	53925.9				
11:32	120	80	54121.2		-10.4		
11:33	120	100	53975.3				

Wag
Coush

MAGNETIC SURVEY DATA SHEET

FIGURE 9

AR308186

#4

Site Name

NCR

By

Location

Date

TIME	LINE #	POSITION	TOTAL FIELD	VERTICAL GRADIENT	ERROR	TOTAL FIELD CORRECTION	CORRECTED TOTAL FIELD	Under/Over
11:34	140	100	53896.4					
11:35	140	80	53793.0					
11:35	140	60	53746.0					
11:36	140	40	53912.1					
11:36	140	20	53961.8					
11:36	140	0	53880.0					
11:37	85		53952.5					
11:39	0	10	53957.8					
11:40	0	30	53951.9					
11:41	0	50	53948.6					
11:41	0	70	53964.9					
11:41	0	90	53973.7					

MAGNETIC SURVEY DATA SHEET

FIGURE 9

7

Site Name _____ By _____
 Location _____ Date _____

TIME	LINE #	POSITION	TOTAL FIELD	VERTICAL GRADIENT	ERROR	TOTAL FIELD CORRECTION	CORRECTED TOTAL FIELD
11:43	0	110	53987.8				
11:44	0	120	53954.5				
11:44	20	130	54152.4				
11:45	20	110	54013.4				
11:46	20	90	53986.3				
11:46	20	70	53987.6				
11:47	20	50	53959.7				
11:47	20	30	53971.0				
11:49	20	10	53978.0				
11:49	BS		53955.0				
12:10	40	10	53967.7				
12:01	40	30	53958.6				

MAGNETIC SURVEY DATA SHEET

FIGURE 9

AR308188

48

Site Name _____ By _____
 Location _____ Date _____

TIME	LINE #	POSITION	TOTAL FIELD	VERTICAL GRADIENT	ERROR	TOTAL FIELD CORRECTION	CORRECTED TOTAL FIELD
12:02	40	50	5385.2				
12:02	40	70	5385.0				
12:03	40	90	5396.3				
12:03	40	110	5397.8				
12:03	40	130	5407.6				
12:04	60	130	5398.3				
12:06	60	110	5395.1				
12:06	60	90	5398.4				
12:07	60	70	5376.7				
12:07	60	50	5389.7				
12:08	60	30	5397.8				
12:08	60	10	5392.1				
12:09	BS		5395.2				

Mag. decl.

MAGNETIC SURVEY DATA SHEET

FIGURE 9

AR308189

#9

Site Name _____ By _____
 Location _____ Date _____

TIME	LINE #	POSITION	TOTAL FIELD	VERTICAL GRADIENT	ERROR	TOTAL FIELD CORRECTION	CORRECTED TOTAL FIELD
12:19	80	10	53968.3				
12:14	80	30	53964.1				
12:15	80	50	53961.6				
12:16	80	70	53961.1				
12:15	80	90	53964.0				
12:16	100	90	53954.0				
12:17	100	70	53930.7				
12:17	100	50	53959.6				
12:18	100	30	53967.2				
12:18	100	10	53970.9				
12:19	BS		53953.9				
12:19	BS		53952.9				
12:20	120	10	53956.9				
12:20	120	30	53951.6				
12:21	120	50	53939.1				

MAGNETIC SURVEY DATA SHEET

FIGURE 9

AR308190

Site Name _____
 Location _____
 By _____
 Date _____

[illegible]

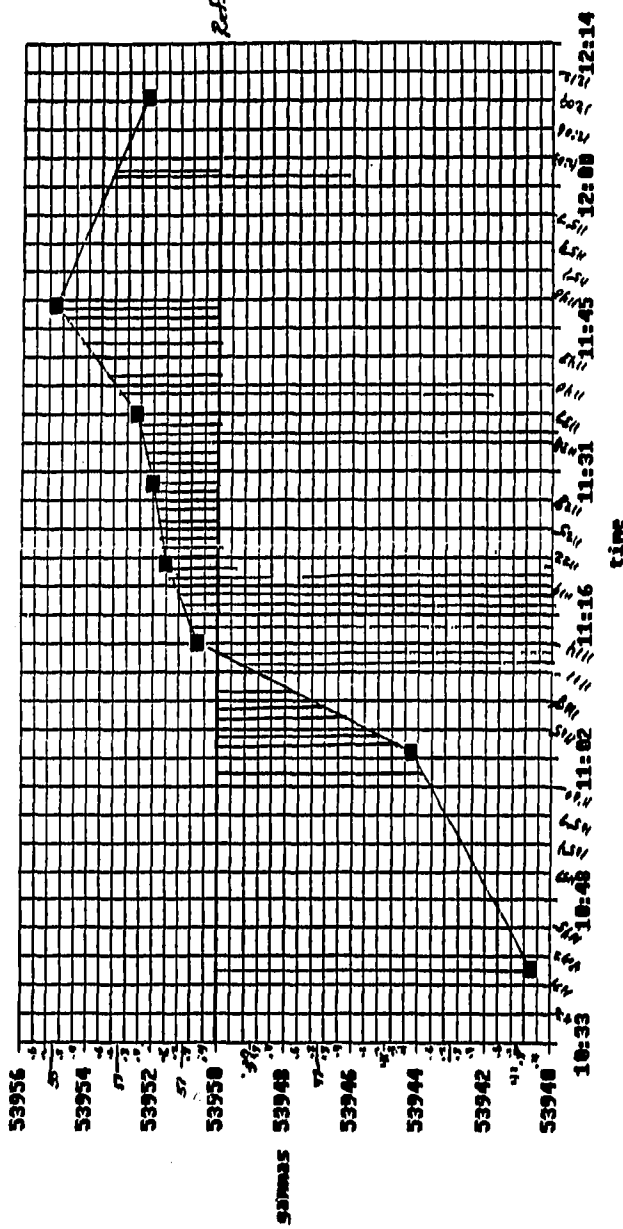
MAGNETIC SURVEY DATA SHEET

FIGURE 9

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AR308191

NCRM685.XLC



AR308192

NCR Millsboro - Magnetometer Survey Data

Line	Pos	Total Field	Total Field Correction	Corrected Total Field
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NCR Millsboro - Magnetometer Survey Data

Line	Pos	Total Field	Total Field Correction	Corrected Total Field
0	0	53947.2	-6.2	53941.0
0	20	53948.2	-4.8	53943.4
0	40	53947.7	-3.8	53943.9
0	80	53961.9	-3.2	53958.7
0	100	53962.9	-3.2	53959.7
0	120	53972.8	-3.2	53969.6
20	120	54076.8	-2.2	54074.6
20	100	53984.6	-1.0	53983.6
20	80	53972.6	-0.8	53971.8
20	60	53964.9	-0.8	53964.1
20	40	53966.3	-0.8	53965.5
20	20	53967.7	0.0	53967.7
20	0	53975.4	0.6	53976.0
40	0	53966.4	0.8	53967.2
40	20	53960.2	0.8	53961.0
40	40	53963.8	1.0	53964.8
40	60	53969.1	1.0	53970.1
40	80	53945.6	1.0	53946.6
40	100	53984.5	1.1	53985.6
40	120	54025.4	1.2	54026.6
60	120	54017.3	1.3	54018.6
60	100	53954.2	1.4	53955.6
60	80	53987.5	1.4	53988.9
60	60	53975.4	1.4	53976.8
60	40	53974.5	1.4	53975.9
60	20	53972.9	1.6	53974.5
60	0	53985.4	1.6	53987.0
80	0	53962.8	1.7	53964.5
80	20	53959.2	1.7	53960.9
80	40	53962.5	1.8	53964.3
80	60	53961.2	1.8	53963.0
80	80	53932.1	1.8	53933.9
80	100	53943.3	1.8	53945.1
100	100	53925.8	1.8	53927.6
100	80	53885.9	1.9	53887.8
100	60	53956.1	1.9	53958.0
100	40	53970.2	1.9	53972.1
100	20	53975.3	2.0	53977.3
100	0	53980.0	2.0	53982.0
120	0	53956.2	2.0	53958.2
120	20	53956.1	2.1	53958.2
120	40	53945.0	2.1	53947.1
120	60	53925.9	2.2	53928.1
120	80	54121.2	2.2	54123.4
120	100	53795.3	2.2	53797.5

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NCR Millsboro - Magnetometer Survey Data

Line	Pos	Total Field	Total Field Correction	Corrected Total Field
140	80	53893.0	2.4	53895.4
140	60	53846.0	2.4	53848.4
140	40	53912.1	2.4	53914.5
140	20	53961.8	2.4	53964.2
140	0	53880.0	2.4	53882.4
0	10	53957.8	3.0	53960.8
0	30	53954.9	3.2	53958.1
0	50	53948.6	3.4	53952.0
0	70	53964.9	3.4	53968.3
0	90	53973.7	3.4	53977.1
0	110	53968.8	3.8	53972.6
0	130	53954.5	4.2	53958.7
20	130	54152.4	4.2	54156.6
20	110	54013.4	4.5	54017.9
20	90	53986.3	4.7	53991.0
20	70	53967.6	4.7	53992.3
20	50	53959.7	5.0	53964.7
20	30	53971.0	5.0	53976.0
20	10	53978.0	5.1	53983.1
40	10	53967.7	3.4	53971.1
40	30	53958.6	3.3	53961.9
40	50	53965.2	3.2	53968.4
40	70	53965.0	3.2	53968.2
40	90	53968.3	3.0	53971.3
40	110	53970.8	3.0	53973.8
40	130	54077.6	3.0	54080.6
60	130	53984.3	2.8	53987.1
60	110	53958.1	2.6	53960.7
60	90	53998.4	2.6	54001.0
60	70	53976.7	2.5	53979.2
60	50	53968.7	2.5	53971.2
60	30	53974.8	2.4	53977.2
60	10	53992.1	2.4	53994.5
80	10	53968.3	3.1	53971.4
80	30	53964.1	3.1	53967.2
80	50	53961.6	3.2	53964.8
80	70	53961.1	3.2	53964.3
80	90	53946.0	3.2	53949.2
100	90	53854.0	3.4	53857.4
100	70	53930.7	3.6	53934.3
100	50	53959.6	3.6	53963.2
100	30	53967.2	3.7	53970.9
100	10	53970.9	3.7	53974.6
120	10	53956.9	4.1	53961.0
120	30	53951.6	4.1	53955.7
120	50	53939.1	4.3	53943.4
120	70	53881.3	4.6	53885.9

AR308194

Appendix B - Soil boring logs

AR308194a

BORING LOG Environmental Strategies Corporation 8521 Leesburg Pike Vienna, Virginia 22182			PROJECT NCR Corporation _____ Millsboro, DE			Boring No. <u>SBV-16</u>		
						Sheet <u>1</u> of <u>2</u>		
						Date Drilled <u>May 3, 1990</u>		
Drilling Co. <u>Delmarva Drilling Company</u> Driller <u>Jeff DeCarlo</u> RSC Geologist <u>Daniel Sandhaus</u>						Boring Location <u>10 feet SE of WP-9</u> Ground Elevation _____ TOC Elevation _____		
Boring Method <u>Hollow stem auger</u> Hole Diameter <u>8.25"</u> Inside Diameter <u>4.25"</u> Total Depth <u>12 feet</u>			Casing/Screen Type <u>N/A</u> Diameter _____ Screen Length _____ Screen Slot Size _____			Sampler Method <u>Split spoon</u> Length (ft.) <u>2</u> Hammer (lbs.) <u>140</u> Fall (ins.) <u>30</u>		
Sample I.D.	P.I.D. (ppm)	Percent Recovery	Sample Depth	Blows/6'	Well Design	Sample Description		
SS-01	0	50	0'-2'	5/5/3/3		0"-4" Dark brown topsoil, medium sand some fine sand, trace silt. 1" thick gray clay layer at 11 inches. 4"-12" Medium yellow-brown medium sand, little fine sand, some silt and clay, 1" clay layer at 11".		
SS-02	0	42	2'-4'	2/1/0/1		Medium yellow-brown medium sand with gray clay blebs.		
SS-03	0	75	4'-6'	4/14/17/14		0"-3" As above, medium yellow-brown medium sand with gray clay blebs. 3"-4" Gray clay. 4"-6" As in 0"-3" interval above. 6"-16" Gray fine sand and silt, some clay, medium stiff, dry. 16"-18" Medium yellow-brown medium sand gray clay blebs (as above).		
SS-04	18	75	6'-8'	6/9/10/16		0"-6" As above, medium yellow-brown medium sand with gray clay blebs. 6"-18" White to light gray medium sand, little fine sand.		
SS-05	7	83	8'-10'	5/3/6/6		0"-3" Light gray medium sand. 3"-4" Light gray clay. 4"-12" Light gray medium sand and clay. 12"-14" Light gray clay. Perched water just above clay. PID = 0 ppm. 14"-20" Light gray medium sand, no clay.		
6	0	67	10'-12'	4/4/4/5		Light gray medium sand, some coarse sand, trace gravel. Water at 11.5 feet. End of boring at 12 feet		

AR308195

BORING LOG Environmental Strategies Corporation 8521 Leesburg Pike Vienna, Virginia 22182	PROJECT <u>NCR Corporation</u>		Boring No. <u>SBV-15</u>
	<u>Millaboro, DE</u>		Sheet <u>2</u> of <u>2</u>
			Date Drilled <u>May 3, 1990</u>

Drilling Co. <u>Delmarva Drilling Company</u> Driller <u>Jeff DeCarlo</u> ESG Geologist <u>Daniel Sandhaus</u>	Boring Location <u>5 feet NW of WP-12</u> Ground Elevation _____ TOC Elevation _____
--	--

Boring Method <u>Hollow stem auger</u> Hole Diameter <u>8.25"</u> Inside Diameter <u>4.25"</u> Total Depth <u>12 feet</u>		Casing/Screen Type <u>N/A</u> Diameter _____ Screen Length _____ Screen Slot Size _____		Sampler Method <u>Split spoon</u> Length (ft.) <u>2</u> Hammer (lbs.) <u>140</u> Fall (ins.) <u>30</u>	
--	--	--	--	---	--

Sample I.D.	P.I.D. (ppm)	Percent Recovery	Sample Depth	Blows/6"	Well Design	Sample Description
SS-06	30 10 4	92	10'-12'	4/3/3/3		White to pale gray medium sand, some coarse sand at bottom (saturated). Water at 11 feet. End of boring at 12 feet.

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BORING LOG Environmental Strategies Corporation 8521 Leesburg Pike Vienna, Virginia 22182			PROJECT <u>NCR Corporation</u> <u>Millsboro, DE</u>			Boring No. <u>SBV-15</u> Sheet <u>1</u> of <u>2</u> Date Drilled <u>May 3, 1990</u>		
Drilling Co. <u>Delmarva Drilling Company</u> Driller <u>Jeff DeCarlo</u> ESC Geologist <u>Daniel Sandhaus</u>					Boring Location <u>5 feet NW of WP-12</u> Ground Elevation _____ TOC Elevation _____			
Boring Method <u>Hollow stem auger</u> Hole Diameter <u>8.25"</u> Inside Diameter <u>4.25"</u> Total Depth <u>12 feet</u>				Casing/Screen Type <u>N/A</u> Diameter _____ Screen Length _____ Screen Slot Size _____		Sampler Method <u>Split spoon</u> Length (ft.) <u>2</u> Hammer (lbs.) <u>140</u> Fall (ins.) <u>30</u>		
Sample I.D.	P.T.D. (ppm)	Percent Recovery	Sample Depth	Blows/6'	Well Design	Sample Description		
SS-01	12 0	88	0'-2'	3/3/8/11		0"-8" Dark brown topsoil, fine to medium sand, trace silt. Creosote mass at 4", creosote stains from 0"-8" (may be from adjacent RR track). 8"-21" Light brown medium and fine sand, trace silt.		
SS-02	38 11	92	2'-4'	6/5/7/10		Yellowish-gray medium sand, some fine sand.		
SS-03	0-3	92	4'-6'	6/5/7/10		Yellowish-gray medium sand, little fine sand, some medium yellow-brown strata.		
SS-04	20 8 3 1	75	6'-8'	6/8/11/17		White to pale yellowish-gray, very uniform medium sand.		
SS-05	1.6 0 0	75	8'-10'	6/4/3/5		0"-3" Pale yellowish-gray, black, and medium orange-brown coarse and very coarse sand, some fine gravel and medium sand. 3"-9" White to pale gray medium sand, some fine sand and silt. 9"-10" Gray clay, trace fine sand. 10"-18" Orange and white medium sand with interspersed clay. Clay stratum at 17".		

AR308197

BORING LOG Environmental Strategies Corporation 8521 Leesburg Pike Vienna, Virginia 22182				PROJECT <u>NCR Corporation</u> <u>Millaboro, DE</u>		Boring No. <u>SRV-17</u> Sheet <u>1</u> of <u>1</u> Date Drilled <u>May 3, 1990</u>	
Drilling Co. <u>Delmarva Drilling Company</u> Driller <u>Jeff DeCarlo</u> ESC Geologist <u>Daniel Sandhaus</u>				Boring Location <u>25 feet N of WP-20</u> Ground Elevation _____ TOC Elevation _____			
Boring Method <u>Hollow stem auger</u> Hole Diameter <u>8.25"</u> Inside Diameter <u>4.25"</u> Total Depth <u>12 feet</u>		Casing/Screen Type <u>N/A</u> Diameter _____ Screen Length _____ Screen Slot Size _____		Sampler Method <u>Split spoon</u> Length (ft.) <u>2</u> Hammer (lbs.) <u>140</u> Fall (ins.) <u>30</u>			
Sample I.D.	P.I.D. (ppm)	Percent Recovery	Sample Depth	Blows/6'	Well Design	Sample Description	
SS-01	0	96	0'-2'	4/6/8/8		0"-3" Dark brown topsoil, medium sand, some silt. 3"-23" Medium yellow-brown medium sand.	
SS-02	10 0	75	2'-4'	6/5/5/7		0"-11" As above. 11"-18" Light gray clay and medium sand, dry:	
SS-03	10	75	4'-6'	6/6/7/8		Medium yellow-brown medium sand.	
SS-04	14 0	83	6'-8'	10/15/ 16/19		Medium yellow-brown medium and coarse sand, orange-brown in bottom 3 inches.	
SS-05	7	71	8'-10'	6/11/ 12/10		Medium yellow-brown medium and coarse sand, some fine gravel.	
SS-06	10 3 0	83	10'-12'	3/2/1/0		Light gray medium sand, some coarse sand, fine light gray sand in bottom 2 inches. Water at 11 feet. End of boring at 12 feet.	

AR308198

BORING LOG Environmental Strategies Corporation 8521 Leesburg Pike Vienna, Virginia 22182			PROJECT <u>NCR Corporation</u> <u>Millsboro, DE</u>		Boring No. <u>SBV-18</u> Sheet <u>1</u> of <u>1</u> Date Drilled <u>May 3, 1990</u>	
Drilling Co. <u>Delmarva Drilling Company</u> Driller <u>Jeff DeCarlo</u> ESC Geologist <u>Daniel Sandhaus</u>				Boring Location <u>Between WP-20 and WP-6</u> Ground Elevation _____ TOC Elevation _____		
Boring Method <u>Hollow stem auger</u> Hole Diameter <u>8.25"</u> Inside Diameter <u>4.25"</u> Total Depth <u>12 feet</u>		Casing/Screen Type <u>N/A</u> Diameter _____ Screen Length _____ Screen Slot Size _____		Sampler Method <u>Split spoon</u> Length (ft.) <u>2</u> Hammer (lbs.) <u>140</u> Fall (ins.) <u>30</u>		
Sample I.D.	P.I.D. (ppm)	Percent Recovery	Sample Depth	Blows/6'	Well Design	Sample Description
SS-01	3 0	79	0'-2'	4/4/4/5		0"-6" Dark brown topsoil, medium sand, little fine sand. 6"-12" Mottled medium yellow-brown and gray medium sand and clay. 12"-19" Gray clay.
SS-02	0	88	2'-4'	5/6/5/6		Medium yellow-brown medium sand, trace clay.
SS-03	0 10 0	58	4'-6'	8/11/9/11		0"-5" As above. 5"-14" Light gray medium sand and clay, dry. PID = 10 ppm just above dry clayey layer.
SS-04	0	88	6'-8'	9/14/16/17		0"-6" Medium orange-brown medium sand, little fine sand. 6"-18" Orange medium and coarse sand. 18"-21" Tan (some orangish) medium sand.
SS-05	0	63	8'-10'	8/10/10/7		White to light gray medium and coarse sand.
SS-06	15	100	10'-12'	3/2/2/3		Light gray (with some orange streaks) coarse sand, some medium sand. Water at 11 feet. End of boring at 12 feet.

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BORING LOG Environmental Strategies Corporation 6521 Leesburg Pike Vienna, Virginia 22182		PROJECT NCR Corporation _____ Millsboro, DE		Boring No. <u>SRV-19</u> Sheet <u>1</u> of <u>1</u> Date Drilled <u>May 4, 1990</u>		
Drilling Co. <u>Delmarva Drilling Company</u> Driller <u>Jeff DeCarlo</u> ESC Geologist <u>Daniel Sandhaus</u>			Boring Location <u>~20 feet SE of W28C</u> Ground Elevation _____ TOC Elevation _____			
Boring Method <u>Hollow stem auger</u> Hole Diameter <u>8.25"</u> Inside Diameter <u>4.25"</u> Total Depth <u>12 feet</u>		Casing/Screen Type <u>N/A</u> Diameter _____ Screen Length _____ Screen Slot Size _____		Sampler Method <u>Split spoon</u> Length (ft.) <u>2</u> Hammer (lbs.) <u>140</u> Fall (ins.) <u>30</u>		
Sample I.D.	P.I.D. (ppm)	Percent Recovery	Sample Depth	Blows/6"	Well Design	Sample Description
SS-01	7 4 0	83	0'-2'	2/3/3/3		Pale orange medium sand, medium orange color at bottom 3 inches with fine sand.
SS-02	4 2 0	75	2'-4'	3/4/5/2		Medium orange-brown fine sand and silt, trace clay. Bottom 3 inches are gray-orange silt and clay.
SS-03	0	75	4'-6'	2/6/7/1		Gray and grayish-orange silt and clay, some fine sand.
SS-04	20 8 3 1	88	6'-8'	6/7/12/1		0"-16" As above 16"-21" Gray and grayish orange fine sand with some silt.
SS-05	4 6 3 0 3	75	8'-10'	3/5/8/9		0"-6" Gray clay, trace silt and fine sand. 6"-17" Gray and orangish-gray medium and fine sand. 17"-20" Light gray medium and coarse sand, trace fine gravel.
SS-06	26 20 8 5	83	10'-12'	5/4/6/11		0"-9" Gray coarse sand. 9"-10" Gray sandy clay. 10"-12" Orange medium to fine sand, some clay. 12"-20" Gray (with some orange) fine and medium sand, some silt, trace clay. Water at 11.5 feet. End of boring at 12 feet.

AR308200

BORING LOG Environmental Strategies Corporation 8521 Leesburg Pike Vienna, Virginia 22182		PROJECT <u>NCR Corporation</u> <u>Millboro, DE</u>		Boring No. <u>SBV-20</u> Sheet <u>1</u> of <u>2</u> Date Drilled <u>May 4, 1990</u>		
Drilling Co. <u>Delmarva Drilling Company</u> Driller <u>Jeff DeCarlo</u> ESC Geologist <u>Daniel Sandhaus</u>			Boring Location <u>Magnetic survey grid 80.80</u> Ground Elevation _____ TOC Elevation _____			
Boring Method <u>Hollow stem auger</u> Hole Diameter <u>8.25"</u> Inside Diameter <u>4.25"</u> Total Depth <u>14 feet</u>		Casing/Screen Type <u>N/A</u> Diameter _____ Screen Length _____ Screen Slot Size _____		Sampler Method <u>Split spoon</u> Length (ft.) <u>2</u> Hammer (lbs.) <u>140</u> Fall (ins.) <u>30</u>		
Sample I.D.	P.I.D. (ppm)	Percent Recovery	Sample Depth	Blows/6'	Well Design	Sample Description
SS-01	55	0	0'-2'	7/8/11/17		No recovery. Auger cuttings are stained fill composed of dark gray-brown medium and fine sand and silt, with a slight oily odor. (Reading taken from inside augers.)
SS-02		0	2'-4'	15/17/11/9		As above.
SS-03	66 40 114	58	2'-4'	2/1/3/6		
SS-04	44 7	25	4'-6'	3/3/7/14		Dark gray-brown odorous fill as above to a depth of 6 feet. Appears to be native soil below 6'.
SS-05	31 80 20 26	92	6'-8'	7/9/12/12		0"-6" Mottled gray and medium orange-brown clay, moderately plastic. 6"-12" Fine sand and silt, trace clay. 12"-22" Fine and medium sand, trace silt.
SS-06	52 4 12 15 8	71	8'-10'	6/9/7/14		Light grayish-brown medium sand. little fine sand, coarser in bottom 3 inches.

AR308201

BORING LOG Environmental Strategies Corporation 8521 Leesburg Pike Vienna, Virginia 22182				PROJECT <u>NCR Corporation</u> <u>Millsboro, DE</u>		Boring No. <u>SRV-20</u> Sheet <u>2</u> of <u>2</u> Date Drilled <u>May 4, 1990</u>	
Drilling Co. <u>Delmarva Drilling Company</u> Driller <u>Jeff DeCarlo</u> ESC Geologist <u>Daniel Sandhaus</u>				Boring Location <u>Magnetic survey grid 80.80</u> Ground Elevation _____ TOC Elevation _____			
Boring Method <u>Hollow stem auger</u> Hole Diameter <u>8.25"</u> Inside Diameter <u>4.25"</u> Total Depth <u>14 feet</u>				Casing/Screen Type <u>N/A</u> Diameter _____ Screen Length _____ Screen Slot Size _____		Sampler Method <u>Split spoon</u> Length (ft.) <u>2</u> Hammer (lbs.) <u>140</u> Fall (ins.) <u>30</u>	
Sample I.D.	P.I.D. (ppm)	Percent Recovery	Sample Depth	Blows/6'	Well Design	Sample Description	
SS-07	5 15 10 0	67	10'-12'	7/10/ 13/14		0"-10" As above. 10"-16" Pale orange-brown coarse sand, some medium and fine sand.	
SS-08	42 60 42 25	67	12'-14'	6/8/ 10/12		As above. End of boring at 14 feet.	

AR308202

BORING LOG Environmental Strategies Corporation 8521 Leesburg Pike Vienna, Virginia 22182				PROJECT NCR Corporation _____ Millsboro, DE		Boring No. <u>SBV-21</u> Sheet <u>1</u> of <u>2</u> Date Drilled <u>May 4, 1990</u>	
Drilling Co. <u>Delmarva Drilling Company</u> Driller <u>Jeff DeCarlo</u> ESC Geologist <u>Daniel Sandhaus</u>				Boring Location <u>Magnetic survey grid 40.60</u> Ground Elevation _____ TOC Elevation _____			
Boring Method <u>Hollow stem auger</u> Hole Diameter <u>8.25"</u> Inside Diameter <u>4.25"</u> Total Depth <u>12 feet</u>		Casing/Screen Type <u>N/A</u> Diameter _____ Screen Length _____ Screen Slot Size _____		Sampler Method <u>Split spoon</u> Length (ft.) <u>2</u> Hammer (lbs.) <u>140</u> Fall (ins.) <u>30</u>			
Sample I.D.	P.I.D. (ppm)	Percent Recovery	Sample Depth	Blows/6"	Well Design	Sample Description	
SS-01	25 10 132 70 130	96	0'-2'	3/7/13/11		0"-2" Dark brown topsoil, fine sand and silt. 2"-14" Medium brown (with some orange) medium sand, little fine sand. 14"-18" Dark brown to black (with white mottling) fine sand. 18"-23" Gray-brown medium sand, trace fine sand. Fill to 2 feet.	
02	2 2 1	79	2'-4'	5/4/2/2		Medium brown medium sand, then medium brown (with orange) silt and clay, trace fine sand. Texture looks like native soil.	
SS-03	12 0 3 0	83	4'-6'	4/9/17/22		0"-6" Medium brown silt and clay, trace fine sand. 6"-18" Gray-brown clay, trace fine sand, stiff, dry, mottled white and orange. 18"-20" Medium orange-brown medium sand, some fine sand.	
SS-04	29 26 3 0	79	6'-8'	13/16/11/7		0"-7" Medium orange-brown medium sand, some fine sand. 7"-12" Light brown medium and fine sand. 12"-16" Orange medium and fine sand, some clay. 16"-19" Gray clay, trace fine sand.	
SS-05	0	83	8'-10'	5/8/12/14		0"-1" Gray clay. 1"-14" Medium orange-brown medium sand. 14"-20" Light gray medium sand.	

AR308203

BORING LOG Environmental Strategies Corporation 8521 Leesburg Pike Vienna, Virginia 22182			PROJECT <u>NCR Corporation</u> <u>Millsboro, DE</u>		Boring No. <u>SBV-21</u> Sheet <u>2</u> of <u>2</u> Date Drilled <u>May 4, 1990</u>	
Drilling Co. <u>Delmarva Drilling Company</u> Driller <u>Jeff DeCarlo</u> ESC Geologist <u>Daniel Sandhaus</u>				Boring Location <u>Magnetic survey grid 40.60</u> Ground Elevation _____ TOC Elevation _____		
Boring Method <u>Hollow stem auger</u> Hole Diameter <u>8.25"</u> Inside Diameter <u>4.25"</u> Total Depth <u>12 feet</u>		Casing/Screen Type <u>N/A</u> Diameter _____ Screen Length _____ Screen Slot Size _____		Sampler Method <u>Split spoon</u> Length (ft.) <u>2</u> Hammer (lbs.) <u>140</u> Fall (ins.) <u>30</u>		
Sample I.D.	P.I.D. (ppm)	Percent Recovery	Sample Depth	Blows/6"	Well Design	Sample Description
SS-06	0	50	10'-12'	7/10/ 12/11		Light gray medium and coarse sand. Water at 12 feet. End of boring at 12 feet.
AR308204						

**Appendix C - Review of laboratory quality assurance/quality
control data for samples from the soil borings**

AR308204a

Review of laboratory quality assurance/quality control data for samples from the soil borings

Eight laboratory blanks were analyzed in support of the 16 soil samples from the soil borings. Methylene chloride was detected above the detection limit in four of the eight laboratory blanks. Methylene chloride in the blanks ranged from 4.0 to 9.6 ug/kg, compared to a detection limit of 2.9 ug/kg. The laboratory, Compuchem Laboratories of North Carolina, also submitted quality assurance notices outlining the laboratory's policy concerning common laboratory artifacts in samples.

Methylene chloride was detected in eleven of the sixteen samples ranging from 3.3 to 330 ug/kg. Only two samples reported detection of methylene chloride above 14 ug/kg, sample SBV20(2-4') at 330 ug/kg and sample SBV21(0-2') at 290 ug/kg. The two samples reporting high levels of methylene chloride required dilution (125:1) because of high levels of trichloroethylene. The high concentrations of methylene chloride in the two samples are probably exaggerated by the dilution necessary to quantitate trichloroethylene. The levels of methylene chloride in the other samples (3.3-14 ug/kg) are comparable to levels found in the associated laboratory blanks (4.0-9.6 ug/kg). Table 1 summarizes laboratory blanks and associated samples and the levels of methylene chloride reported.

Methylene chloride was also detected in the trip blank associated with the samples, at 1.4 ug/l. The trip blank was provided by the laboratory and provides a check of laboratory contamination of volatile vials and laboratory water.

The information submitted by the laboratory indicates a systematic contamination with methylene chloride. Methylene chloride is a common laboratory contaminant that is used as a solvent for liquid-liquid extractions. The levels in the samples are generally comparable to the levels found in associated laboratory blanks, substantiating laboratory system contamination.

AR308205

Table 1. Laboratory blanks and associate samples

<u>Laboratory Blank</u>	<u>Associated Samples</u>	<u>MeCl2 Conc.</u>
R03042	SBV20(2-4'),	BDL
R77016	SBV15(10-12), SBV15(6-8) SBV19(10-12)	9.6 ug/kg
R77008	SBV18(4-6), SBV18(10-12)	8.1 ug/kg
R03059	SBV21(0-2), SBV19(8-10)	4.0 ug/kg
R77027	SBV16(6-8), SBV17(4-6)	BDL
R94057	SBV16(8-10), SBV21(14-16), SBV15(6-8), SBV16(6-8), SBV17(4-6)	BDL
R77045	SBV17(6-8), SBV21(10-12)	4.1 ug/kg
R94048	SBV18(10-12), SBV19(10-12)	BDL

a/ BDL = Below Detection Limit (2.9 ug/kg)

AR308206

QUALITY ASSURANCE NOTICE #2

Sample # 337047

ID: SBV151012

Blank I.D. R77016

Following the conventions established by the EPA for qualifying common laboratory artifacts in samples analyzed under the Contract Laboratory Program (CLP) Caucus Organics Protocols, we have reported the following compound with the "B" footnote:

<u>common laboratory artifact</u>	<u>blank concentration</u>	<u>units</u>
Methylene Chloride	<u>9.6</u>	<u>ug/kg</u>

The "B" indicates that this analyte was also detected in the associated Instrument Blank. This footnote is only used for the common laboratory solvent, methylene chloride. No adjustments are made to the analytical results.

The EPA-CLP protocols permit up to 25 ug/l of methylene chloride in volatile blanks analyzed by GC/MS. Our policy is much more stringent for non-CLP requirements. The maximum allowable level for methylene chloride in Method 601 Instrument Blanks is 5 ug/l. Exceptions to these policies are made only when sample Holding Times are in jeopardy of being exceeded, or when three successive Instrument Blanks have been analyzed, all with methylene chloride concentrations less than 10 ug/l. (These blanks demonstrate that the level of contamination remained relatively constant during the shift in which the above sample was analyzed--the blank with the highest level of methylene chloride is reported above in such cases).

Data Interpretation: General EPA Guidelines

In evaluating data usability, the EPA uses certain general guidelines for assessing the presence of common laboratory artifacts in samples. If the concentration of an artifact in a sample is greater than ten times that in the blank, the blank contribution is considered negligible. If blank and sample concentrations are comparable (sample level not greater than twice the blank level), the presence of that compound in the sample is considered suspect.

Robert J. Whitehead
Manager, Quality Assurance

AR308207

QUALITY ASSURANCE NOTICE #3

Sample # 337054, 337055

ID: SBV184-6', SBV181012

Blank I.D. R77008

Following the conventions established by the EPA for qualifying common laboratory artifacts in samples analyzed under the Contract Laboratory Program (CLP) Caucus Organics Protocols, we have reported the following compound with the "B" footnote:

<u>common laboratory artifact</u>	<u>blank concentration</u>	<u>units</u>
Methylene Chloride	<u>8.1</u>	<u>ug/kg</u>

The "B" indicates that this analyte was also detected in the associated Instrument Blank. This footnote is only used for the common laboratory solvent, methylene chloride. No adjustments are made to the analytical results.

The EPA-CLP protocols permit up to 25 ug/l of methylene chloride in volatile blanks analyzed by GC/MS. Our policy is much more stringent for non-CLP requirements. The maximum allowable level for methylene chloride in Method 601 Instrument Blanks is 5 ug/l. Exceptions to these policies are made only when sample Holding Times are in jeopardy of being exceeded, or when three successive Instrument Blanks have been analyzed, all with methylene chloride concentrations less than 10 ug/l. (These blanks demonstrate that the level of contamination remained relatively constant during the shift in which the above sample was analyzed--the blank with the highest level of methylene chloride is reported above in such cases).

Data Interpretation: General EPA Guidelines

In evaluating data usability, the EPA uses certain general guidelines for assessing the presence of common laboratory artifacts in samples. If the concentration of an artifact in a sample is greater than ten times that in the blank, the blank contribution is considered negligible. If blank and sample concentrations are comparable (sample level not greater than twice the blank level), the presence of that compound in the sample is considered suspect.

Robert J. Whitehead
Manager, Quality Assurance

AR308208

QUALITY ASSURANCE NOTICE #4

Sample # 337064

ID: SBV210-2'

Blank I.D. R03059

Following the conventions established by the EPA for qualifying common laboratory artifacts in samples analyzed under the Contract Laboratory Program (CLP) Caucus Organics Protocols, we have reported the following compound with the "B" footnote:

<u>common laboratory artifact</u>	<u>blank concentration</u>	<u>units</u>
Methylene Chloride	4.0	ug/kg

The "B" indicates that this analyte was also detected in the associated Instrument Blank. This footnote is only used for the common laboratory solvent, methylene chloride. No adjustments are made to the analytical results.

The EPA-CLP protocols permit up to 25 ug/l of methylene chloride in volatile blanks analyzed by GC/MS. Our policy is much more stringent for non-CLP requirements. The maximum allowable level for methylene chloride in Method 601 Instrument Blanks is 5 ug/l. Exceptions to these policies are made only when sample Holding Times are in jeopardy of being exceeded, or when three successive Instrument Blanks have been analyzed, all with methylene chloride concentrations less than 10 ug/l. (These blanks demonstrate that the level of contamination remained relatively constant during the shift in which the above sample was analyzed--the blank with the highest level of methylene chloride is reported above in such cases).

Data Interpretation: General EPA Guidelines

In evaluating data usability, the EPA uses certain general guidelines for assessing the presence of common laboratory artifacts in samples. If the concentration of an artifact in a sample is greater than ten times that in the blank, the blank contribution is considered negligible. If blank and sample concentrations are comparable (sample level not greater than twice the blank level), the presence of that compound in the sample is considered suspect.

Robert J. Whitehead
Manager, Quality Assurance

AR308209

QUALITY ASSURANCE NOTICE #6

Sample # 337053, 337662, 337068

ID: SBV176-B', A100212, SBV211012

Blank I.D. R77045

Following the conventions established by the EPA for qualifying common laboratory artifacts in samples analyzed under the Contract Laboratory Program (CLP) Caucus Organics Protocols, we have reported the following compound with the "B" footnote:

<u>common laboratory artifact</u>	<u>blank concentration</u>	<u>units</u>
Methylene Chloride	<u>4.1</u>	<u>ug/kg</u>

The "B" indicates that this analyte was also detected in the associated Instrument Blank. This footnote is only used for the common laboratory solvent, methylene chloride. No adjustments are made to the analytical results.

The EPA-CLP protocols permit up to 25 ug/l of methylene chloride in volatile blanks analyzed by GC/MS. Our policy is much more stringent for non-CLP requirements. The maximum allowable level for methylene chloride in Method 601 Instrument Blanks is 5 ug/l. Exceptions to these policies are made only when sample Holding Times are in jeopardy of being exceeded, or when three successive Instrument Blanks have been analyzed, all with methylene chloride concentrations less than 10 ug/l. (These blanks demonstrate that the level of contamination remained relatively constant during the shift in which the above sample was analyzed--the blank with the highest level of methylene chloride is reported above in such cases).

Data Interpretation: General EPA Guidelines

In evaluating data usability, the EPA uses certain general guidelines for assessing the presence of common laboratory artifacts in samples. If the concentration of an artifact in a sample is greater than ten times that in the blank, the blank contribution is considered negligible. If blank and sample concentrations are comparable (sample level not greater than twice the blank level), the presence of that compound in the sample is considered suspect.

Robert J. Whitehead
Manager, Quality Assurance

AR308210

Appendix D - Potential risks presented by TCE and chromium in soils

AR308210a

Potential Risks Presented by TCE and Chromium in Soils

Recent test excavations at the NCR Millsboro site revealed trichloroethylene (TCE) and total chromium in subsurface soils at concentrations that exceed previously-detected soil concentrations. TCE was detected at a maximum concentration of 63 mg/kg (at a depth of three feet) and total chromium was detected at a maximum concentration of 205 mg/kg (at a depth of two feet).

To determine the potential health risks that would be associated with TCE and total chromium in soils, ESC evaluated potential human exposure to the chemicals using the future residential soil exposure soil scenario presented in the risk assessment for the NCR Millsboro site. The residential soil exposure scenario uses the assumptions that a future resident on the site would be exposed to soils through yard work, play, and gardening. Exposure could occur through inadvertent ingestion of soil or through dermal absorption of soil contaminants. It is further assumed that exposure would occur 200 days per year for a duration of 70 years. The exposure pathway equation and exposure variables used to estimate human intake of the chemicals of concern are presented in the risk assessment for the site.

Quantitative estimates of potential risks associated with residential exposure to TCE and total chromium in subsurface soils at the NCR Millsboro site are presented in Table 1. Excess lifetime cancer risk (upper bound) associated with inadvertent ingestion of soils containing 63 mg/kg of TCE is 7×10^{-7} , less than EPA's target risk range of 10^{-4} to 10^{-6} . Dermal exposure to soils is estimated to present an upper bound cancer risk of 8×10^{-6} , within EPA's target risk range. Ingestion exposure to chromium is estimated to be less than the reference dose for hexavalent chromium (hazard index = 0.3), indicating that there is a negligible probability of systemic toxicity.

It is unlikely that the potential risks associated with residential exposure to TCE and total chromium are underestimated. The exposure assumptions are very conservative. The maximum concentrations of TCE and total chromium were assessed, but these concentrations are not representative of the entire site. In addition, the maximum concentrations of TCE and total chromium were detected in subsurface soils, rather than surface soils. Subsurface soils

AR308211

are less likely to be the subject of almost daily exposure. A future residential exposure scenario was used, which is the most conservative scenario that is plausible. This scenario assumed that a resident would dwell on the site for 70 years, even though the national upper-bound (90th percentile) time at one residence is 30 years (EPA 1989. Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual).

The dermal exposure scenario indicated a potential for the largest intake of TCE. In this scenario, a default assumption was used that indicates that 50 percent of the TCE in soil will be absorbed through the skin. A desorption/absorption efficiency of 50 percent for removing TCE from soil and absorbing it through the skin borders on the physically implausible. Assuming that 50 percent of a dilute solution of TCE would be absorbed through the skin requires the accompanying assumption that 100 percent of the TCE would be desorbed from the soil. Even though the adsorption coefficient of TCE is low ($\log K_{oc} = 2$), it is physically unlikely that all of the TCE would be desorbed from soil, then all of the TCE would be adsorbed to the skin, and then 50 percent of TCE would be absorbed through the skin.

To assess the potential for systemic toxicity from exposure to total chromium, the reference dose for hexavalent chromium was used. This reference dose is almost three orders of magnitude smaller than the reference dose for trivalent chromium, which comprises at least a portion of the total chromium present at the site. In addition, the reference dose for hexavalent chromium is based on an animal study that did not exhibit adverse effects at the highest test dose.

The assessment of the carcinogenic classification and potency for TCE has been withdrawn from the Integrated Risk Information System (IRIS) by the EPA pending further review. TCE causes liver tumors in mice, but several strains of mice appear to develop a high and variable proportion of liver tumors with or without exposure to chemicals. As a result, there is disagreement in the scientific community about the relevance of mouse liver tumors as indicators of human cancer risk. Due to uncertainty within EPA regarding the weight of evidence and the carcinogenic potential of TCE, the site-specific risk assessment of TCE should be considered uncertain.

AR308212

In summary, the risk assessment conducted for the maximum detected concentrations of TCE and total chromium in subsurface soils indicates that exposure to chromium is unlikely to pose significant risk to public health (hazard index = 0.3). Exposure to TCE was associated with upper bound excess cancer risks of 7×10^{-7} for the ingestion route and 8×10^{-6} for the dermal route of exposure. The potential risks were estimated utilizing a residential exposure scenario and maximum concentrations of the compounds in subsurface soils. The risk assessment is unlikely to underestimate the potential risks, and may have overestimated risk.

AR308213

Table 1
Potential Health Risks Associated with Residential Exposure to Soils (a)

<u>Chemical</u>	<u>Maximum</u> <u>Concn.</u> <u>(mg/kg)</u>	<u>Depth</u> <u>(feet)</u>	<u>Pathway</u>	<u>Child</u> <u>Intake</u> <u>(mg/kg/d)</u>	<u>Adult</u> <u>Intake</u> <u>(mg/kg/d)</u>	<u>Lifetime</u> <u>Intake</u> <u>(mg/kg/d)</u>	<u>Reference</u> <u>Dose</u> <u>(mg/kg/d)</u>	<u>Cancer</u> <u>Slope</u> <u>(mg/kg/d)</u>	<u>Hazard</u> <u>Index</u>	<u>Lifetime</u> <u>Upper Bound</u> <u>Cancer Risk</u>
Trichloroethylene	63	3	Ingestion Dermal	3.7E-05 3.8E-04	2.3E-05 3.2E-04	6.0E-05 7.0E-04	NA NA	1.1E-02 1.1E-02	NA NA	7E-07 8E-06
Total Chromium	205	2	Ingestion	1.4E-03	8.0E-05	1.5E-03	5.0E-03	NA	3E-01	NA

a/ The potential risks calculated in Table 1 are based on the exposure assumptions and scenarios presented in the Human Health Evaluation for the NCR Millsboro, Delaware National Priority List site.

AR308214



STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
DIVISION OF AIR AND WASTE MANAGEMENT

WASTE MANAGEMENT SECTION

715 GRANTHAM LANE
NEW CASTLE, DELAWARE 19720-4801

TELEPHONE: (302) 323-4540

January 3, 1991

David R. Kindig, P.E.
Director, Regulatory Remedial Program Division
Environmental Strategies Corporation
8521 Leesbury Pike, Suite 650
Vienna, VA 22182

Subject: Review and Comments of the Revised NCR Supplemental Soils
Investigation Report.

Dear Mr. Kindig:

Enclosed are the comments from the review of the revised Supplemental Soil
Investigation Report for the NCR Millsboro, Delaware, NFL Site. Our Department
requests an expeditious review of the comments and submission of a finalized
version of the Soils Investigation Report by January 18, 1991.

Should you have any questions, please feel free to contact me at:
(302) 323-4541.

Sincerely,

Dilip R. Hansalia
Environmental Engineer
Remedial-Superfund

DRH2038
DRH/bls

pc: Stephen Williams
Robert Ricci (3HW25)
Dr. Williams S. Brewer (NCR)

AR308215



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

Mr. Dilip Hansalia
State of Delaware
Dept. of Natural Resources
and Environmental Control
715 Grantham Lane
New Castle, Delaware 19720

DEC 20 1980

Subject: Review of the Revised NCR Supplemental Soil Investigation.

Dear Dilip:

Review of the Supplemental Soil Investigation at the NCR Millsboro site has been completed.

In general, EPA does not fully agree with the conclusions that are made concerning the vertical extent of contamination, as was previously stated during review of the first draft report. Since relatively high headspace readings were encountered with soils from a six foot depth and were not sent to the laboratory for chemical analysis according to plans specified in the work plan, it is inappropriate to base conclusions on the vertical extent of contamination solely on the analytical results of samples sent to the laboratory.

In addition, since the discrepancies between split sample results have not been addressed in the revised report and the significance of the presence of methylene chloride in several samples is still in dispute, it is suggested that a full EPA validation report be submitted as an appendix to the report.

The revised report fails to satisfactorily explain why deviations in the work plan were made. However, overall the contaminants detected during the study do not pose a threat to human health via direct contact and previous results of groundwater analysis in this study area suggests that the contaminants are not impacting the groundwater. However, it is suggested that the groundwater in this area continue to be monitored. Wells 28 (down gradient) and 5 (well closest to the contaminated soil area) are suggested for future groundwater analysis. It is understood that ESC plans to present a revised groundwater monitoring plan, and that DNREC, EPA, and ESC will be discussing this in detail.

Specific comments from EPA and CDM-FPC (oversight) are attached for

AR308216
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your review. If you have any questions please contact me at (215) 597-9238. As we have discussed by phone a conference call or meeting will be necessary to discuss these comments as well as the comments for the revised RI report.

Sincerely,

Roberta Riccio
Roberta Riccio
RPM, DE/MD Section

enclosures

cc: Bruce Pluta, CDM-FPC
Dawn Ioven, 3HW15
Philip Rotstein, 3HW15

AR308217

EPA's Specific comments:

- p.4 Reference to the August 18, 1989 RI report will have to be updated throughout the report.
- p.5 The results of the split sampling done by CDM for SBV-6,7,and 8 should be presented in the report.
- p.11, line 15 This statement is incorrect and should be clarified. Several samples which screened high for volatiles were not sent for analysis. SBV-16 10-12 feet SBV-18 6-8 feet were examples of this.
- p.29, line 9 Further justification is necessary regarding the QA/QC data in Appendix C to indicate that the levels of methylene chloride in samples SBV2102 and SBV2002 are insignificant.
- p.39, 3rd full paragraph: The evidence for the conclusion that methylene chloride levels in samples A46206 and B110212 is due to dilution should should be further clarified with qualified data.
- p.51, line 2: This statement is either incorrect or must be clarified since samples were not analyzed from the six foot depth in the location where the 63ppm of TCE was detected.

AR308218

CDM FEDERAL PROGRAMS CORPORATION

December 17, 1990

**Ms. Roberta Riccio
U.S. Environmental Protection Agency
841 Chestnut Building, 6th floor
Philadelphia, PA 19107**

PROJECT: EPA CONTRACT NO.: 68-W9-0004
DOCUMENT NO.: TES7-C03031-EP-CBKW
**SUBJECT: Work Assignment C03031
NCR Corporation
Review of the Supplemental
Soil Investigation Revised Draft Report**

Dear Ms. Riccio:

The purpose of this letter is to present the findings of the CDM FEDERAL PROGRAMS CORPORATION (FPC) review of the revised Supplemental Soil Investigation Draft Report submitted by Environmental Strategies Corporation (ESC) for the NCR Corporation site, Millsboro, Delaware and dated November 7, 1990. This report was received for review by FPC on December 13, 1990.

In general, the subject report addressed many of the comments provided by EPA as a result of the review of the August 23, 1990 draft report. However, several issues still require clarification.

The revised ESC draft report did not address the discrepancies noted between ESC and FPC analytical results reported for the samples obtained from Trenches A and B. As previously noted, analysis of split samples obtained by FPC at the time of sample collection indicated the presence of 1,2-dichloroethene (sample number B90606), toluene (sample number A46206), and xylene (sample number A46206) in the onsite soils; none of the aforementioned compounds have been reported as being present in ESC's results. In addition, FPC's results indicated the presence of trichloroethylene (TCE) in sample number A46206 at a concentration of 11,000 ug/kg, whereas, ESC reported a TCE concentration of 970 ug/kg. Again, these discrepancies may be attributable to the dilution of ESC's samples, however, they should be noted in the report.

AR308219

Ms. Riccio
Page 2

FPC's specific comments are itemized below.

Page 1. Last Sentence

The revisions made to the text do not address EPA's comment: "The selection of samples for laboratory analysis appears to have been based on more than visual observation and screening with the PID or OVA, or the Work Plan Specifications. It should also be explained why samples from a greater depth were collected when they did not meet the above criteria and shallower samples taken from the same location (i.e., distance from trench origin or same bore hole) were not sent for lab analysis even though they may have met the above criteria for sample selection outlined in the Work Plan."

In addition, the revisions that were made are confusing. Contrary to what is stated, sample selection criteria can not be used to define the limits of contamination and confirm the absence of contamination.

Page 11. 2nd Paragraph

The reason for not extending Trench B the entire 150 feet must still be explained.

Page 20. Table 1

As noted during the previous review, the criteria implemented for the final selection of split spoon samples for laboratory analysis must be fully explained as it differs from the approach outlined in the Work Plan.

Page 27. 1st Full Paragraph

The text still must be corrected. Headspace analysis of the sample from the four to six foot interval (SBV2046) is initially discussed. The text continues with a discussion of the chemical analysis, however, the results for the six to eight foot interval are discussed and not that for the four to six foot interval.

Page 34. 3rd Paragraph

The text should still provide an explanation of why the sample with the hNu reading of 300 ppm at the 6 foot depth was not analyzed.

Again, it should be clarified why the trench ended at 110 feet and if the staining ended at this distance.

AR308220

Ms. Riccio
Page 3

Page 49

While the laboratory analytical data does support this statement, the headspace analysis of samples not submitted for laboratory analysis (300 ppm at 6 foot depth) indicates more extensive contamination. This statement must be corrected.

Page 52. 1st Full Paragraph

As noted above and as is noted by ESC on page 49, contamination is not limited to four feet of depth. This conclusion must be corrected.

It is again recommended that field screening and headspace analysis data be compared with the laboratory analytical data to more accurately define the vertical extent of contamination. It appears that the current interpretation of the vertical extent of contamination was based solely upon the laboratory data.

Appendix C

It is recommended that the laboratory data be validated utilizing EPA procedures and the entire validation report be presented in the appendix.

If you have any comments regarding this submittal, please contact me at (215) 293-0450 within two weeks of the date of this letter.

Sincerely,
CDM FEDERAL PROGRAMS CORPORATION



Bruce R. Pluta
Work Assignment Manager

cc: Elaine Spiewak, EPA Regional Project Officer, CERCLA Region III
Jean Wright, EPA TES VII Project Officer
Constance V. Braun, FPC Program Manager

AR308221



ENVIRONMENTAL STRATEGIES CORPORATION
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January 18, 1991

Mr. Dilip Hansalia
CERCLA Management Branch
State of Delaware
Division of Air and Waste Management
Department of Natural Resources and
Environmental Control
715 Grantham Lane
New Castle, DE 19720

Re: NCR Millsboro Supplemental Soils Investigation Report

Dear Mr. Hansalia:

Based on our discussions, enclosed is a working document that describes our proposed response to comments provided by U.S. Environmental Protection Agency (EPA) on the Supplemental Soils Investigation Report, November 7, 1990.

After your review of the enclosed materials please call us at your earliest convenience to discuss finalizing the document.

Sincerely yours,

David R. Kindig, P.E.
Director, Regulatory Remedial Programs

DRK:csb:has
#557

Enclosure

cc: Dr. William S. Brewer, NCR Corporation
Ms. Robert Riccio, EPA

EPA's Specific Comments:

Page 4

The references pertaining to the RI have been updated to January 1991.

Page 5

The split sampling results provided by CDM have been added as an Appendix.

Page 11, line 15

The statement has been edited to read "The two samples with the highest observed headspace and field screening readings at each location were submitted for laboratory analysis."

Page 29, line 9

A full QA/QC review has been completed utilizing EPA guidelines replaces Appendix C and is enclosed for your review.

Page 39, 3rd Paragraph

The conclusions regarding that methylene chloride levels observed in diluted samples is discussed in the revised QA/QC review package.

See amended Appendix C.

Page 52, line 2

The correct depth is two feet, not six feet.

AR308223

FPC's specific comments

Page 3, last sentence

The criteria used was a combination of both the field screening and the headspace analysis. The samples that had highest readings from both screenings were sent for laboratory analysis.

The sentence "However, additional sample selection criteria, based on contaminant distribution and representation were also used to define the limits of contamination and to confirm the absence of contamination in some locations" has been deleted.

Page 13, 2nd paragraph

Additional discussion regarding rationale behind discontinuing the completion of the trench will be added to the report. Additional sampling was conducted to address the area.

Page 20, Table 1

The sample collected at SBV15 from the interval 2-4 feet was sent for analysis because the EPA oversight contractor collected a sample from this interval based solely on the field screening. After the head space analyses were conducted this sample was not one of the three highest samples (interval, 4-6 feet, interval 6-8 feet and interval 10-12 feet). Because, the oversight contractor did not have another sample bottle to split one of the three highest samples, the sample from the interval 2-4 feet was sent for analysis.

A footnote is added to sample SBV-15 interval 2-4 feet which states "Sample did not meet screening criteria for laboratory analysis. However, the sample was sent for laboratory analysis because a split sample was collected by EPA's oversight contractor for QA/QC validation."

Also note response to comment on page 3

Page 27, 1st full paragraph

The sentence has been corrected to read "Headspace analysis of samples from the two- to four-foot (SBV2024) and ~~six- to eight-foot~~ (SBV2046) intervals showed VOC readings of 100 and 130 ppm.

Page 38, 3rd paragraph

A sample was collected at a depth of 2 feet in a visibly contaminated area. A sample was not collected at a depth of 6 feet because the soils were native sands and no staining was evident.

AR308224

Page 49

The sentence has been edited to "Those data indicate the majority of the TCE..."

Appendix C

The appendix has been redone following EPA procedures.

AR308225

APPENDIX C
DATA VALIDATION REVIEW
OF
WASTE CHARACTERIZATION AND SOIL BORING SAMPLES

AR308226.

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1.0 Introduction

The Supplemental Soils Investigation of the former NCR Corporation site at Millsboro, Delaware, involved the analysis of Soil Boring (SBV), Trench (A and B) and Waste Characterization (WC) samples collected in May and June 1990.

The samples were analyzed for EPA Method 8010 volatile organic compounds and chromium. Four field blanks and four trip blanks were also collected with these samples. The field and trip blanks were analyzed for Method 8010 volatiles only.

All samples were collected by ESC personnel and were analyzed according to Contract Laboratory Program (CLP) and method-specific protocols by CompuChem Laboratories, Inc., of Raleigh, North Carolina.

Section 2.0, Sample Data as Reported by the Laboratory, contains tables that list the analytical data as they were reported by the laboratory, including the result qualifying flags that the laboratory assigned on the basis of the CLP statements of work. The tables include results for field and trip blanks. Section 3.0, Results, and Section 4.0, Analytical Problems, discusses the review by ESC's scientific staff of the analytical results according to the EPA February 1, 1988, "Laboratory Data Validation Functional Guidelines for Evaluating Organics and Inorganic Analyses," taking into account the June 1988 "Region III Modifications to Functional Guidelines" for these types of data.

Section 5.0, Sample Data Summaries - Revised Based on Validation, summarizes the analytical results as qualified on the basis of data validation review. Section 6.0 contains a glossary of data qualifiers.

2.0 Sample Data as Reported by the Laboratory

The following data tables, 2-1 through 2-6, present the raw data as reported by the laboratory without QA/QC review.

Table 2-1
Soil Sampling Results From the NCR Methanol Facility
May 1990

	EPC ID	A40205	A60505	A70212	A45205	A60205	ADN12	A100212	A120512	FIELD BLK	TRIPLE-LANE
	Labatory ID	337672	337693	337691	337703	337705	337685	337682	337644	337712	330411
	Sample Date	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90
Bromobenzene		0.8 U	0.8 U	0.8 U	63 U	0.8 U	0.8 U	0.8 U	0.8 U	0.5 U	0.5 U
Carbon tetrachloride		0.6 U	0.6 U	0.6 U	25 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
Chlorobenzene		0.8 U	0.8 U	0.8 U	38 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Dibromochloromethane		0.7 U	0.7 U	0.7 U	25 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Chloroethane		2.4 U	2.4 U	2.4 U	63 U	2.4 U	2.4 U	2.4 U	2.4 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether		0.9 U	0.9 U	0.9 U	50 U	0.9 U	0.9 U	0.9 U	0.9 U	0.4 U	0.4 U
Chloroform		0.6 U	0.6 U	0.6 U	25 U	0.6 U	1.1	0.6 U	0.6 U	0.35 U	0.35 U
Bromodichloromethane		0.7 U	0.7 U	0.7 U	38 U	0.7 U	0.7 U	0.7 U	0.7 U	0.4 U	0.4 U
1,1-Dichloroethane		0.6 U	0.6 U	0.6 U	25 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
1,2-Dichloroethane		0.8 U	0.8 U	0.8 U	38 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U	0.25 U
1,1,1-Trichloroethane		0.6 U	0.6 U	0.6 U	25 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
1,2-Dichloropropane		0.9 U	0.9 U	0.9 U	25 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
Cis-1,2-Dichloropropene		2.6 U	2.6 U	2.6 U	63 U	2.6 U	2.6 U	2.6 U	2.6 U	0.45 U	0.45 U
Bromonitrobenzene		2.9 U	2.9 U	2.9 U	190 B	5.6 B	15	3.5 B	2.9 U	1.9 B	2.8 B
Methylene chloride		0.5 U	0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U
1,1,2,2-Tetrachloroethane		0.7 U	0.7 U	0.7 U	38 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Tetrachloroethylene		0.9 U	0.9 U	0.9 U	38 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
1,1,1,2-Tetrachloroethane		2.6 U	2.6 U	2.6 U	38 U	2.6 U	2.6 U	2.6 U	2.6 U	0.35 U	0.35 U
1,1,2-Trichloroethane		0.8 U	0.8 U	0.8 U	25 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U	0.25 U
Trichloroethylene		0.7 U	0.7 U	0.7 U	970 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Vinyl chloride		2.4 U	2.4 U	2.4 U	63 U	2.4 U	2.4 U	2.4 U	2.4 U	0.35 U	0.35 U
Bromochloromethane		0.8 U	0.8 U	0.8 U	38 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
2-Chloroethanol		1 U	1 U	1 U	38 U	1 U	1 U	1 U	1 U	0.4 U	0.4 U
1,2-Dibromochloromethane (Bisphenol A derivative)		1.1 U	1.1 U	1.1 U	38 U	1.1 U	1.1 U	1.1 U	1.1 U	0.4 U	0.4 U
Trans-1,2-Dichloropropene		0.7 U	0.7 U	0.7 U	25 U	0.7 U	0.7 U	0.7 U	0.7 U	0.25 U	0.25 U
1,1,1,2-Tetrachloroethane		0.8 U	0.8 U	0.8 U	38 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2,3-Trichloropropene		0.8 U	0.8 U	0.8 U	38 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Bromobenzene		0.6 U	0.6 U	0.6 U	100 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
Dibromochloromethane		0.8 U	0.8 U	0.8 U	50 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2-Dichlorobenzene		1.2 U	1.2 U	1.2 U	25 U	1.2 U	1.2 U	1.2 U	1.2 U	0.2 U	0.2 U
1,3-Dichlorobenzene		1 U	1 U	1 U	25 U	1 U	1 U	1 U	1 U	0.2 U	0.2 U
1,4-Dichlorobenzene		1.2 U	1.2 U	1.2 U	25 U	1.2 U	1.2 U	1.2 U	1.2 U	0.2 U	0.2 U
Chloronitrobenzene (mg/kg)		171	101	94.4	93.4	18.9	4.8	1.8 U	13.7	NA	NA

AR308230

Table 2.2

Soil Sampling Results From the NCR Methane Facility
May 1990

RSC ID	A130606	A130612	B02012	B30012	B30012	B70012	B100015	B100012	B100012	FIELD #	TRIP #
Labatory ID	337992	337992	337994	337992	338022	338022	337990	337990	337990	337992	338041
Sample Date	05/08/90	05/08/90	05/08/90	05/08/90	05/08/90	05/08/90	05/08/90	05/08/90	05/08/90	05/08/90	05/08/90
Benzene	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.5 U	0.5 U
Carbon tetrachloride	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
Chlorobenzene	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Dibromochloromethane	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Chloroethane	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.4 U	0.4 U
Chloroform	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Bromochloromethane	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.4 U	0.4 U
1,1-Dichloroethane	1.4	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.35 U	0.35 U
1,2-Dichloroethane	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
1,1,1-Trichloroethane	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
1,1,2-Trichloroethane	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.3 U	0.3 U
1,2-Dichloropropane	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
Chloro-1,3-Dichloropropylene	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.45 U	0.45 U
Bromochloroethane	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	0.3 U	0.3 U
Chloroethane	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	0.5 U	0.5 U
Methylene chloride	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	2.8 B	2.8 B
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U
Tetrachloroethylene	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Trans-1,2-Dichloroethylene	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.35 U	0.35 U
1,1,1-Trichloroethane	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
1,1,2-Trichloroethane	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
Trichloroethylene	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.35 U	0.35 U
Vinyl chloride	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	0.3 U	0.3 U
Bromochloromethane	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	0.35 U	0.35 U
2-Chloroethane	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
4-Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.4 U	0.4 U
1,2-Dibromochloroethane (Bibenzyl chloride)	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.4 U	0.4 U
Trans-1,3-Dichloropropylene	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.25 U	0.25 U
1,1,1,2-Tetrachloroethane	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2,3-Trichloropropylene	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Bromochloroethane	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
Dibromochloroethane	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2-Dichloroethane	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	0.3 U	0.3 U
1,3-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.2 U	0.2 U
1,4-Dichloroethane	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	0.2 U	0.2 U
Chloroform (mg/g)	3.8	19.2	14.9	3.9	2.3	4.1	4	3.7	NA	NA	NA

AR308231

Table 2-3

Soil Sampling Results From the NCR-Milwaukee Facility
May 1990

	EPC ID	WC#	B1#	WC#	C1#	WC#	LAD#	FIELD#
	Lab ID	338035	338035	338035	338035	338035	337710	538040
	Sample Date	05/02/90	05/02/90	05/02/90	05/02/90	05/02/90	05/02/90	05/02/90
Benzene	4 U	1300 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	3 U	750 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
Chloroacetylene	4 U	750 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Dichloroacetylene	3.5 U	500 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Chloroacetylene	12 U	1300 U	2.4 U	2.4 U	2.4 U	2.4 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	4.5 U	1000 U	0.9 U	0.9 U	0.9 U	0.9 U	0.4 U	0.4 U
Chloroform	6.7 U	750 U	0.7 U	0.7 U	0.7 U	0.7 U	0.35 U	0.35 U
Bromochloroacetylene	3 U	1000 U	0.6 U	0.6 U	0.6 U	0.6 U	0.4 U	0.4 U
1,1-Dichloroacetylene	0.69 U	750 U	0.7 U	0.7 U	0.7 U	0.7 U	0.35 U	0.35 U
1,2-Dichloroacetylene	3 U	500 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
1,1-Dichloroethylene	4 U	750 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2-Dichloroethylene	3 U	500 U	0.6 U	0.6 U	0.6 U	0.6 U	0.3 U	0.3 U
Chloro-1,3-Dichloropropylene	4.5 U	500 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
Bromochloroacetylene	13 U	1300 U	2.6 U	2.6 U	2.6 U	2.6 U	0.45 U	0.45 U
Chloroacetylene	12 U	1300 U	2.3 U	2.3 U	2.3 U	2.3 U	0.5 U	0.5 U
Methylene chloride	140 B	6000 B	12 B	12 B	12 B	12 B	17 B	12 B
1,1,2,2-Tetrachloroacetylene	2.5 U	1000 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U
Tetrachloroethylene	3.5 U	750 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Trans-1,2-Dichloroethylene	1.5 U	750 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
1,1,1-Trichloroethylene	0.82 U	750 U	2.6 U	2.6 U	2.6 U	2.6 U	0.35 U	0.35 U
1,1,2-Trichloroethylene	1.5 U	750 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U	0.25 U
Trichloroethylene	4 U	500 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Vinyl chloride	12 U	1300 U	2.4 U	2.4 U	2.4 U	2.4 U	0.35 U	0.35 U
Bromochloroacetylene	4 U	1000 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
2-Chloroacetylene	4.5 U	500 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
4-Chloroacetylene	1.8 U	750 U	1.1 U	1.1 U	1.1 U	1.1 U	0.4 U	0.4 U
1,2-Dichloroacetylene (ethylene dibromide)	5.5 U	750 U	0.7 U	0.7 U	0.7 U	0.7 U	0.25 U	0.25 U
Trans-1,2-Dichloroethylene	3.5 U	500 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,1,1,2-Tetrachloroethylene	4 U	750 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2,3-Trichloropropylene	4 U	750 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U	0.25 U
Bromochloroacetylene	3 U	1000 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
Dibromochloroacetylene	4 U	1000 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U	0.25 U
1,2-Dichloroacetylene	6.2 U	500 U	1.2 U	1.2 U	1.2 U	1.2 U	0.3 U	0.3 U
1,3-Dichloroacetylene	5 U	500 U	1.1 U	1.1 U	1.1 U	1.1 U	0.2 U	0.2 U
1,4-Dichloroacetylene	6.2 U	500 U	1.2 U	1.2 U	1.2 U	1.2 U	0.2 U	0.2 U
Chloroacetylene (mg/kg)	43.9	54	17.3	17	22.9	NA	NA	NA

AR308232

Table 2-4
Soil Sampling Results From the NCR Methane Facility
May 1990

	ESC ID	SRV152-4'	SRV152-5'	SRV151012	SRV152-30	SRV174-6'	SRV174-3'	SRV184-6'	LAB FURE	FB
	Labomory ID	337040	337045	337047	337051	337052	337053	337054	337070	337136
	Sample Date	01/03/90	05/03/90	05/03/90	05/03/90	05/03/90	05/03/90	05/03/90	05/03/90	05/03/90
Benzofuran		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
Carbon tetrachloride		0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.3 U	0.3 U
Chlorobenzene		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
Dibromochloromethane		0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Chloroethane		2.4 U	2.4 U	2.4 U	2.3 U	2.4 U	2.4 U	2.4 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether		0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.4 U	0.4 U
Chloroform		0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.3 U	0.3 U
Bromochloromethane		0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.4 U	0.4 U
1,1-Dichloroethane		0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
1,2-Dichloroethane		0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
1,1-Trichloroethane		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
1,2-Dichloropropane		0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.3 U	0.3 U
Chloro-1,2-Dichloropropane		0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.45 U	0.45 U
Bromochloroethane		2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	0.45 U	0.45 U
Chloroethane		2.3 U	2.3 U	2.3 U	2.3 U	2.4 U	2.3 U	2.3 U	0.5 U	0.5 U
Methylene chloride		12	2.9 U	10 B	3.7	2.9 U	3.7	6.5 B	1.4	1.4
1,1,2,2-Tetrachloroethane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U
Tetrachloroethylene		0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Trans-1,2-Dichloroethane		0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
1,1,1-Trichloroethane		2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	0.35 U	0.35 U
1,1,2-Trichloroethane		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U	0.25 U
Trichloroethylene		0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Vinyl chloride		2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	0.3 U	0.3 U
Bromochloroethane		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
2-Chloroethane		0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
4-Chloroethane		1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.4 U	0.4 U
1,2-Dibromochloromethane (Ethylene dichloride)		1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.4 U	0.4 U
Trans-1,2-Dichloropropylene		0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.25 U	0.25 U
1,1,1,2-Tetrachloroethane		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2,3-Trichloropropylene		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Bromobenzene		0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
Dibromochloromethane		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
1,2-Dichlorobenzene		1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	0.3 U	0.3 U
1,3-Dichlorobenzene		1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.2 U	0.2 U
1,4-Dichlorobenzene		1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.2 U	0.2 U
Chlorobenzene (mg/kg)		NA	NA	NA	NA	NA	NA	NA	NA	NA

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Table 2.5

Soil Sampling Results From the NCR-Midhemo Facility
May 1990

Compound	ESV19012 337035 05/04/90	ESV19012 337034 05/04/90	ESV202-4* 337035 05/04/90	ESV210-2* 337037 05/04/90	ESV211012 337038 05/04/90	ESV211616 337039 05/04/90	LAB FILE# 337070 05/04/90	FB 337136 05/04/90
Bromoforn	0.8 U	0.8 U	63 U	63 U	0.8 U	0.8 U	0.5 U	0.5 U
Carbon tetrachloride	0.6 U	0.6 U	38 U	38 U	0.6 U	0.6 U	0.35 U	0.35 U
Chlorobenzene	0.8 U	0.8 U	38 U	38 U	0.8 U	0.8 U	0.35 U	0.35 U
Dibromochloromethane	0.7 U	0.7 U	25 U	25 U	0.7 U	0.7 U	0.3 U	0.3 U
Chloroethane	2.4 U	2.4 U	63 U	63 U	2.4 U	2.4 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	0.9 U	0.9 U	50 U	50 U	0.9 U	0.9 U	0.4 U	0.4 U
Bromodichloromethane	0.6 U	0.6 U	38 U	38 U	0.6 U	0.6 U	0.35 U	0.35 U
1,1-Dichloroethane	0.7 U	0.7 U	38 U	38 U	0.7 U	0.7 U	0.4 U	0.4 U
1,2-Dichloroethane	0.8 U	0.8 U	38 U	38 U	0.8 U	0.8 U	0.35 U	0.35 U
1,1-Dichloroethylene	0.6 U	0.6 U	25 U	25 U	0.6 U	0.6 U	0.35 U	0.35 U
1,2-Dichloropropene	0.9 U	0.9 U	25 U	25 U	0.9 U	0.9 U	0.3 U	0.3 U
Cis-1,3-Dichloropropylene	2.6 U	2.6 U	63 U	63 U	2.6 U	2.6 U	0.45 U	0.45 U
Bromonitrobenzene	23 U	23 U	63 U	63 U	23 U	23 U	0.5 U	0.5 U
Chloronitrobenzene	73 B	85	330	290 B	33 B	45	1.4	1.4
Methylene chloride	0.5 U	0.5 U	50 U	50 U	0.5 U	0.5 U	0.4 U	0.4 U
1,1,2,2-Tetrachloroethane	0.7 U	0.7 U	38 U	38 U	0.7 U	0.7 U	0.3 U	0.3 U
Trichloroethylene	0.9 U	0.9 U	38 U	38 U	0.9 U	0.9 U	0.3 U	0.3 U
Trans-1,2-Dichloroethylene	2.6 U	2.6 U	38 U	38 U	2.6 U	2.6 U	0.35 U	0.35 U
1,1,1-Trichloroethane	0.8 U	0.8 U	25 U	25 U	0.8 U	0.8 U	0.25 U	0.25 U
1,1,2-Trichloroethane	0.7 U	0.7 U	38 U	38 U	0.7 U	0.7 U	0.3 U	0.3 U
Vinyl chloride	2.4 U	2.4 U	38 U	38 U	2.4 U	2.4 U	0.35 U	0.35 U
Bromochloroethane	0.8 U	0.8 U	25 U	25 U	0.8 U	0.8 U	0.35 U	0.35 U
2-Chloroethanol	1 U	1 U	38 U	38 U	1 U	1 U	0.4 U	0.4 U
1,2-Dibromochloroethane (ethylene dibromide)	11 U	11 U	38 U	38 U	11 U	11 U	0.4 U	0.4 U
Trans-1,3-Dichloropropylene	0.7 U	0.7 U	25 U	25 U	0.7 U	0.7 U	0.25 U	0.25 U
1,1,1,2-Tetrachloroethane	0.8 U	0.8 U	38 U	38 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2,3-Trichloropropene	0.8 U	0.8 U	38 U	38 U	0.8 U	0.8 U	0.35 U	0.35 U
Bromonitrobenzene	0.6 U	0.6 U	100 U	100 U	0.6 U	0.6 U	0.25 U	0.25 U
1,2-Dichlorobenzene	0.8 U	0.8 U	50 U	50 U	0.8 U	0.8 U	0.35 U	0.35 U
1,3-Dichlorobenzene	12 U	12 U	25 U	25 U	12 U	12 U	0.3 U	0.3 U
1,4-Dichlorobenzene	1 U	1 U	25 U	25 U	1 U	1 U	0.2 U	0.2 U
Chlorobenzene (mg/kg)	12 U	12 U	25 U	25 U	12 U	12 U	0.2 U	0.2 U
	NA	55	54.4	113	3.8	3.2	NA	NA

AR308234

Table 2-6
Soil Sampling Results From the WCR-Medford Facility
June 1990

Chemical	SWV2206 34332 06/05/90	SWV2406 34392 06/05/90	SWV251218 34372 06/05/90	SWV251218 34370 06/05/90	SWV251218 34392 06/05/90	TRMS 34385 06/05/90	FRMS 34380 06/05/90
Benzene	0.8 U	0.5 U	0.8 U	0.8 U	0.8 U	0.5 U	0.5 U
Carbon tetrachloride	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
Chlorobenzene	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Dibromochloromethane	0.7 U	0.7 U	1 U	1 U	1 U	0.3 U	0.3 U
Chloroethane	1.4 U	2.4 U	1.4 U	1.4 U	1.4 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.4 U	0.4 U
Chloroform	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
Bromochloromethane	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.4 U	0.4 U
1,1-Dichloroethane	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.35 U	0.35 U
1,2-Dichloroethane	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
1,1-Dichloroethylene	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2-Dichloroethylene	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.3 U	0.3 U
1,2-Dichloropropane	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.45 U	0.45 U
Chloro-1,3-Dichloropropylene	1.6 U	2.6 U	1.6 U	1.6 U	1.6 U	0.5 U	0.5 U
Bromobenzene	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	1 U	3
Methylene chloride	4.9 B	2.5 B	11 B	18 B	9.2 B	0.4 U	0.4 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.3 U	0.3 U
Tetrachloroethylene	0.7 U	0.9 U	0.9 U	1 U	0.7 U	0.3 U	0.3 U
Trans-1,2-Dichloroethylene	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	0.35 U	0.35 U
1,1,1-Trichloroethane	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U	0.25 U
1,1,2-Trichloroethane	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Trichloroethylene	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	0.35 U	0.35 U
Vinyl chloride	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
Bromochloroethane	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
2-Chloroethanol	1 U	1 U	1 U	1 U	1 U	0.4 U	0.4 U
1,2-Dibromochloroethane (Bibylane dihalide)	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.25 U	0.25 U
Trans-1,3-Dichloropropylene	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.35 U	0.35 U
1,1,1,2-Tetrachloroethane	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U	0.25 U
1,2,3-Trichloropropylene	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
Bromobenzene	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
1,2-Dichlorobenzene	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	0.3 U	0.3 U
1,3-Dichlorobenzene	1.5 U	1 U	1 U	1 U	1 U	0.2 U	0.2 U
1,4-Dichlorobenzene	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	0.2 U	0.2 U
Chloroform (ppb)	144	205	73	129	22	NA	NA

AR308235

3.0 Results

3.1 Summary of Results for Trench A Samples

Ten soil samples were collected from Trench A. Target volatile compounds reported in the A samples were chloroform, methylene chloride, and trichloroethylene. Reported results for methylene chloride have been qualified "U" (reset to detection limit) because of contamination of associate laboratory blanks. One Trench A sample, A46206, was analyzed as a medium level sample because the level of trichloroethylene in the sample was above the calibration range of the instrument. Three Trench A samples (A40206, A70212, and A120612) required reanalysis because of poor surrogate recoveries. The poor recoveries persisted in both runs. Reported detection limits have been qualified "UJ" (estimated detection limits) because at least one surrogate consistently reported recoveries less than 10%. Chromium reported in the Trench A samples ranged from 1.8 - 171 mg/kg. The field and trip blanks associated with the Trench A samples were free of contamination.

3.2 Summary of Results for Trench B Samples

The eight Trench B samples were analyzed for method 8010 volatiles and chromium. Target volatile compounds reported in the B samples were chloroform, methylene chloride, and trichloroethylene. One Trench B sample, B110212, was analyzed as a medium level sample because of trichloroethylene concentration. All reported results for methylene chloride in the samples have been qualified "U" (reset to detection limits) because of contamination of associate laboratory or field blanks. The level of methylene chloride in sample B110212, 6000 ug/kg, was also qualified "U" after comparison of the level of methylene chloride in the sample prior to multiplication by the dilution factor of 2500. Only 2.4 ug/kg of methylene chloride was detected in the sample, compared to 4.8 ug/kg in the laboratory blank associated with the sample. The high level reported in the sample can be attributed to contamination introduced through dilution water exaggerated by the dilution factor. Three Trench B samples required reanalysis because of poor surrogate

recoveries. The poor recoveries persisted upon reanalysis. Reported detection limits have been qualified "UJ" (estimated detection limits) because of poor surrogate recoveries. The reported result for trichloroethylene for sample B30212 has been qualified "J" (estimated concentration) because of poor surrogate recoveries. Chromium concentration in the B samples ranged from 2.3 - 54 mg/kg. The field and trip blanks associated with these samples were free of contamination.

3.3 Summary of Results for Waste Characterization Samples

Two Waste Characterization samples were collected and analyzed for method 8010 volatiles and chromium. Target volatile compounds reported in the WC samples were chloroform, methylene chloride, and trichloroethylene. Sample WC28690 required reanalysis because of poor surrogate recoveries. Reported results for chloroform and trichloroethylene have been qualified "J" (estimated concentration) because of the consistently poor surrogate recoveries. Reported detection limits for the sample have been qualified "UJ" (estimated detection limits). Chloroform and methylene chloride were reported in both samples, while trichloroethylene was reported in sample WC28690 only (5.6 ug/kg). Reported results for methylene chloride in both WC samples have been qualified "U" (reset to detection limits) because of contamination of laboratory blanks associated with the samples. The field and trip blanks associated with the WC samples also reported methylene chloride. However, the methylene chloride results for the blanks were qualified "B" (also found in the laboratory blank). Chromium concentration in the two samples ranged from 22.9 - 43.9 mg/kg.

3.4 Summary of Results for Soil Boring Samples

Twenty-two samples were collected from soil borings and analyzed for method 8010 volatiles and chromium. Target volatile compounds reported in the SBV samples were methylene chloride and trichloroethylene. Reported results for methylene chloride in the samples have been qualified "U" (reset to detection limits) because of associate laboratory

blanks. Methylene chloride was also reported in the associate field and trip blanks. Chloroform was reported in an associate field blank, but was not detected in the samples. Five soil boring samples required reanalysis because of poor surrogate recoveries. For these samples (SBV156-8, SBV166-8, SBV174-6, SBV1810-12, and SBV1910-12) one or both of the surrogates consistently reported recoveries less than 10% in both runs. Although no hits were reported for these samples, the reported detection limits have been qualified "R" (unusable) because of the poor surrogate recoveries. Chromium concentration in the soil boring samples ranged from 2.2 - 205 mg/kg.

3.5 Summary of Results for Quality Control Check Samples

Chloroform and methylene chloride were detected in some trip or field blanks associated with the samples. Results for these target compounds have been qualified as appropriate in the Tables. Samples SBV251218 and SBV251218D are field duplicates. There was good agreement between results reported for the field duplicate samples.

4.0 Analytical Problems

- Chloroform and methylene chloride were reported in some laboratory and field blanks and associated samples. Reported values in the affected samples have been qualified as appropriate.
- Some samples required reanalysis because of poor surrogate recoveries. Generally, upon reanalysis the surrogate outliers persisted. The laboratory attributed the poor surrogate recoveries to matrix interferences. Reported results for these samples have been qualified as appropriate.

5.0 Sample Data Summaries - Revised Based on Validation

The following data tables, 5-1 through 5-6 have been corrected based on the above QA/QC validation.

Table S-1
Soil Sampling Results From the NCR Midstone Facility
May 1990

	ESC ID	A46206	A46205	A30212	A46206	A46205	A40112	A100212	A100312	FIELD BLK TYPE/LANE
	Labatory ID	337672	337693	337691	337705	337706	337685	337682	337644	337712
	Sample Date	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90	05/07/90
Benzofuran		0.8 U	0.8 U	0.8 U	63 U	0.8 U	0.8 U	0.8 U	0.8 U	0.5 U
Carbon tetrachloride		0.6 U	0.6 U	0.6 U	25 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U
Chlorobenzene		0.8 U	0.8 U	0.8 U	38 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U
Dichloromethane		0.7 U	0.7 U	0.7 U	25 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U
Chloroethane		2.4 U	2.4 U	2.4 U	63 U	2.4 U	2.4 U	2.4 U	2.4 U	0.5 U
2-Chloroethyl vinyl ether		0.9 U	0.9 U	0.9 U	50 U	0.9 U	0.9 U	0.9 U	0.9 U	0.4 U
Chloroform		0.6 U	0.6 U	0.6 U	25 U	0.6 U	1.1	0.6 U	0.6 U	0.35 U
Bromochloromethane		0.6 U	0.6 U	0.6 U	50 U	0.6 U	0.6 U	0.6 U	0.6 U	0.4 U
1,1-Dichloroethane		0.7 U	0.7 U	0.7 U	38 U	0.7 U	0.7 U	0.7 U	0.7 U	0.35 U
1,1-Dichloroethylene		0.8 U	0.8 U	0.8 U	38 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U
1,2-Dichloroethane		0.6 U	0.6 U	0.6 U	25 U	0.6 U	0.6 U	0.6 U	0.6 U	0.3 U
1,2-Dichloropropene		0.9 U	0.9 U	0.9 U	25 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U
Cis-1,3-Dichloropropylene		2.6 U	2.6 U	2.6 U	63 U	2.6 U	2.6 U	2.6 U	2.6 U	0.45 U
Bromobenzene		2.3 U	2.3 U	2.3 U	63 U	2.3 U	2.3 U	2.3 U	2.3 U	0.5 U
Chloroethene		2.9 U	2.9 U	2.9 U	190 U	2.9 U	2.9 U	2.9 U	2.9 U	0.5 U
Methylene chloride		0.5 U	0.5 U	0.5 U	30 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U
1,1,2,2-Tetrachloroethane		0.7 U	0.7 U	0.7 U	38 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U
Trans-1,2-Dichloroethylene		0.9 U	0.9 U	0.9 U	38 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U
1,1,1-Trichloroethane		2.6 U	2.6 U	2.6 U	38 U	2.6 U	2.6 U	2.6 U	2.6 U	0.35 U
1,1,2-Trichloroethane		0.8 U	0.8 U	0.8 U	25 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U
Trichloroethylene		0.7 U	0.7 U	0.7 U	970 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U
Vinyl chloride		2.4 U	2.4 U	2.4 U	63 U	2.4 U	2.4 U	2.4 U	2.4 U	0.35 U
Bromochloroethane		0.8 U	0.8 U	0.8 U	38 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U
2-Chloroethanol		0.9 U	0.9 U	0.9 U	25 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U
4-Chlorophenol		1 U	1 U	1 U	38 U	1 U	1 U	1 U	1 U	0.4 U
1,2-Dibromochloroethane (Bisphenol diethylene)		1.1 U	1.1 U	1.1 U	38 U	1.1 U	1.1 U	1.1 U	1.1 U	0.4 U
Trans-1,3-Dichloropropylene		0.7 U	0.7 U	0.7 U	25 U	0.7 U	0.7 U	0.7 U	0.7 U	0.25 U
1,1,1,2-Tetrachloroethane		0.8 U	0.8 U	0.8 U	38 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U
1,2,3-Trichloropropene		0.8 U	0.8 U	0.8 U	38 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U
Bromobenzene		0.6 U	0.6 U	0.6 U	100 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U
Dibromochloroethane		0.8 U	0.8 U	0.8 U	50 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U
1,2-Dichlorobenzene		1.2 U	1.2 U	1.2 U	25 U	1.2 U	1.2 U	1.2 U	1.2 U	0.2 U
1,3-Dichlorobenzene		1 U	1 U	1 U	25 U	1 U	1 U	1 U	1 U	0.2 U
1,4-Dichlorobenzene		1.2 U	1.2 U	1.2 U	25 U	1.2 U	1.2 U	1.2 U	1.2 U	0.2 U
Chromium (mg/kg)		171	101	94.4	93.4	119	4.8	1.8 U	13.7	NA

AR308241

Table 5.2

AR308242

Table 53
Soil Sampling Results From the NCR-Milwaukee Facility
May 1990

	EPC ID	WC28036	B110212	EPC006	C10006	WC28090	LAB FINE	FIELD EX
1. Laboratory ID	338025	338025	338025	338025	338032	338036	337770	338040
2. Sample Date	05/09/90	05/09/90	05/09/90	05/09/90	05/09/90	05/09/90	05/09/90	05/09/90
Benzene	4 U	1300 U	0.8 U	0.8 U	0.8 U	0.8 U	0.5 U	0.5 U
Carbon tetrachloride	3 U	750 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
Chlorobenzene	4 U	750 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Dibromochloromethane	3.5 U	500 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Chloroethane	12 U	1300 U	2.4 U	2.4 U	2.4 U	2.4 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	4.5 U	1000 U	0.9 U	0.9 U	0.9 U	0.9 U	0.4 U	0.4 U
Chloroform	6.7	750 U	0.7 U	0.8 U	0.8 U	1.9 J	0.35 U	0.35 U
Bromodichloromethane	3 U	1000 U	0.6 U	0.6 U	0.6 U	0.6 U	0.4 U	0.4 U
1,1-Dichloroethane	0.69 U	750 U	0.7 U	0.6 U	0.6 U	0.7 U	0.35 U	0.35 U
1,2-Dichloroethane	3 U	500 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
1,1,2-Trichloroethane	4 U	750 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2-Dichloropropane	3 U	500 U	0.6 U	0.6 U	0.6 U	0.6 U	0.3 U	0.3 U
Chloro-1,3-Dichloropropylene	4.5 U	500 U	0.6 U	0.6 U	0.6 U	0.6 U	0.3 U	0.3 U
Bromocyclohexane	13 U	1300 U	2.6 U	2.6 U	2.6 U	2.6 U	0.45 U	0.45 U
Chlorocyclohexane	12 U	1300 U	2.3 U	2.3 U	2.3 U	2.3 U	0.5 U	0.5 U
Methylene chloride	140 U	6000 U	12 U	12 U	12 U	11 U	17 U	12 U
1,1,2,2-Tetrachloroethane	2.5 U	1000 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U
Tetrachloroethylene	3.5 U	750 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Trans-1,2-Dichloroethylene	1.5 U	750 U	0.9 U	0.9 U	0.9 U	0.9 U	0.35 U	0.35 U
1,1,1-Trichloroethane	0.82 U	750 U	2.6 U	2.6 U	2.6 U	2.6 U	0.35 U	0.35 U
1,1,2-Trichloroethane	4 U	500 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U	0.25 U
Trichloroethylene	1.5 U	63000 U	0.7 U	0.8 U	0.8 U	5.6 J	0.3 U	0.3 U
Vinyl chloride	12 U	1300 U	2.4 U	2.4 U	2.4 U	2.4 U	0.35 U	0.35 U
Bromochloromethane	4 U	1000 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
4-Chlorobenzene	4.5 U	500 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
1,2-Dichlorobenzene (Dichloroethylene)	1.8 U	750 U	1.1 U	1.1 U	1.1 U	1.1 U	0.4 U	0.4 U
Trans-1,3-Dichloropropylene	5.5 U	500 U	0.7 U	0.7 U	0.7 U	0.7 U	0.25 U	0.25 U
1,1,2-Trichloroethane	3.5 U	500 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2,3-Trichloropropylene	4 U	750 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Bromobenzene	4 U	750 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
Dibromobenzene	3 U	2000 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
1,2-Dichlorobenzene	4 U	1000 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
1,3-Dichlorobenzene	6.2 U	500 U	1.2 U	1.2 U	1.2 U	1.2 U	0.2 U	0.2 U
1,4-Dichlorobenzene	5 U	500 U	1 U	1 U	1 U	1 U	0.2 U	0.2 U
Chloroform (mg/kg)	6.2 U	500 U	12 U	12 U	12 U	12 U	NA	NA
	43.9	54	17.3	17	17	22.9	NA	NA

AR308243

Table 5-5
Soil Sampling Results From the NCR-Milwaukee Facility
May 1990

Compound	NSC ID	SV181012	SV181012	SV181012	SV200-4'	SV206-5'	SV210-7'	SV21012	SV21016	LAB PURCH	FR
	Labatory ID	337005	337004	337003	337005	337003	337007	337008	337009	337070	337156
	Sample Date	05/01/90	05/01/90	05/01/90	05/01/90	05/01/90	05/01/90	05/01/90	05/01/90	05/01/90	05/01/90
Benzofuran	0.8 R	0.8 U	0.8 R	0.8 R	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.5 U	0.5 U
Carbon tetrachloride	0.6 R	0.6 U	0.6 R	0.6 R	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
Chlorobenzene	0.8 R	0.8 U	0.8 R	0.8 R	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Dibromochloromethane	0.7 R	0.7 U	0.7 R	0.7 R	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Chloroethane	2.4 R	2.4 U	2.4 R	2.4 R	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	0.9 R	0.9 U	0.9 R	0.9 R	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.4 U	0.4 U
Chloroform	0.6 R	0.6 U	0.6 R	0.6 R	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.37 U
Bromochloromethane	0.7 R	0.7 U	0.7 R	0.7 R	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.4 U	0.4 U
1,1-Dichloroethane	0.6 R	0.6 U	0.6 R	0.6 R	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
1,2-Dichloroethane	0.8 R	0.8 U	0.8 R	0.8 R	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.25 U	0.25 U
1,1-Dichloroethylene	0.6 R	0.6 U	0.6 R	0.6 R	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.35 U	0.35 U
1,2-Dichloroethylene	0.9 R	0.9 U	0.9 R	0.9 R	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
Cis-1,2-Dichloropropylene	2.6 R	2.6 U	2.6 R	2.6 R	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	0.45 U	0.45 U
Bromobenzene	2.3 R	2.3 U	2.3 R	2.3 R	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	1.4 U	1.4 U
Chloroacetaldehyde	0.5 R	0.5 U	0.5 R	0.5 R	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U
1,1,2,2-Tetrachloroethane	0.7 R	0.7 U	0.7 R	0.7 R	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.3 U	0.3 U
Trichloroethylene	0.9 R	0.9 U	0.9 R	0.9 R	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.35 U	0.35 U
Trans-1,2-Dichloroethylene	2.6 R	2.6 U	2.6 R	2.6 R	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	0.25 U	0.25 U
1,1,1-Trichloroethane	0.8 R	0.8 U	0.8 R	0.8 R	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
1,1,2-Trichloroethane	0.7 R	0.7 U	0.7 R	0.7 R	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.35 U	0.35 U
Trichlorobenzene	2.4 R	2.4 U	2.4 R	2.4 R	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	0.35 U	0.35 U
Vinyl chloride	0.8 R	0.8 U	0.8 R	0.8 R	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.3 U	0.3 U
Bromochloroethane	0.9 R	0.9 U	0.9 R	0.9 R	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.3 U	0.3 U
2-Chloroethanol	1.1 R	1.1 U	1.1 R	1.1 R	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.4 U	0.4 U
1,2-Dichloroethane (Ethylenediamine)	0.7 R	0.7 U	0.7 R	0.7 R	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.25 U	0.25 U
Trans-1,2-Dichloroethylene	0.8 R	0.8 U	0.8 R	0.8 R	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,1,1,2-Tetrachloroethane	0.8 R	0.8 U	0.8 R	0.8 R	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
1,2,3-Trichloropropane	0.6 R	0.6 U	0.6 R	0.6 R	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.25 U	0.25 U
Bromobenzene	0.8 R	0.8 U	0.8 R	0.8 R	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.35 U	0.35 U
Dibromobenzene	1.2 R	1.2 U	1.2 R	1.2 R	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	0.3 U	0.3 U
1,3-Dichlorobenzene	1.1 R	1.1 U	1.1 R	1.1 R	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.2 U	0.2 U
1,4-Dichlorobenzene	1.2 R	1.2 U	1.2 R	1.2 R	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	0.2 U	0.2 U
Chloroform (avg)	NA	55	87	113	544	113	118	38	32	NA	NA

AR308245

55

AR308246

6.0 Glossary of Data Qualifiers

6.1 Organic Qualifiers - Laboratory Assigned

- U** This flag indicates that the compound was analyzed for, but not detected. The value reported is the quantitation limit. The sample quantitation limit is corrected for dilution and percent solids for soil samples.
- J** This flag indicates an estimated value. This flag is used either when estimating a concentration for a tentatively identified compound (TIC) or when the mass spectral data indicate the presence of a compound that meets the identification criteria, but the result is less than the sample quantitation limit.
- B** This flag is used when the analyte is found in the associated laboratory blank as well as in the sample. It indicates possible blank contamination and warns the data user to take appropriate action. This flag is used for a TIC as well as for a positively identified target compound.

6.2 Organic Qualifiers - Review Assigned

- U** This flag indicates that the compound was analyzed for, but cannot confidently be considered to have been detected at or below the reported quantitation limit.
- UJ** This flag indicates that the detection limits reported for the sample are estimated because of consistently poor surrogate recoveries.

6.3 Inorganic Qualifiers - Laboratory Assigned

- []** The reported value is less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).
- U** Analyte was not detected. The result of the analyte is less than the IDL.

6.4 Inorganic Qualifiers - Review Assigned

- U** Analyte was not detected. The result of the analyte is less than the IDL.



STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
DIVISION OF AIR AND WASTE MANAGEMENT
715 GRANTHAM LANE
NEW CASTLE, DELAWARE 19720-4801

WASTE MANAGEMENT SECTION

TELEPHONE: (302) 323-4540

March 4, 1991

Mr. David R. Kindig, P.E.
Director, Regulatory Remedial Program Division
Environmental Strategies Corporation
8521 Leesburg Pike, Suite 650
Vienna, VA 22182

Subject : Review and comments on the proposed response submitted by ESC on
the draft Remedial Investigation and the Soil Investigation reports.

Dear Mr. Kindig,

Enclosed are the EPA's comments and recommendations to the proposed responses
submitted by ESC to finalize the draft Remedial Investigation and the Soil
Investigation reports for the NCR Millsboro superfund site.

It appears that most of the DNREC's comments have been addressed by ESC in
their January 14, 1991 letter.

If you have any questions, please feel free to contact me at (302) 323-4540.

Sincerely,

Dilip R. Hansalia
Environmental Engineer
Remedial - Superfund

DRH2056
DRH/drh

pc : Stephen N. Williams
↳ Roberta Riccio (3HW25)
Dr. Williams S. Brewer (NCR)

AR308248



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

FEB 23 1991

Mr. Dilip Hansalia
State of Delaware
Division of Air and Waste Management
Dept. of Natural Resources and
Environmental Control
715 Grantham Lane
New Castle, Delaware 19720

Subject: Comments on the proposed responses for the Revised
Remedial Investigation Report for the NCR site.

Dear Dilip:

A review of the proposed responses for the Remedial
Investigation (RI) report for the NCR site has been completed.

ESC has adequately addressed many of the comments made by
EPA both on the draft and revised RI report. However, several
issues are still outstanding.

The following comments presented are considered important
issues by EPA. Although EPA would like all of the following
comments addressed, asterisks (*) precede those issues which EPA
believes are key issues that should be addressed prior to
finalization of the RI report.

If you have any questions concerning these comments, please
contact me at 215-597-9238. Thank you.

Sincerely,

Roberta Riccio

Roberta Riccio
Remedial Project Manager
DE/MD Section

cc: Bruce Pluta, CDM-FPC
Dawn Ioven, 3HW15
Philip Rothstein, 3HW24
Peter Ludzia, 3HW25

AR308219
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Specific Comments

Section 1.0 - Introduction:

Page 1-5: EPA feels it is necessary to add page numbers.

Page 1-8, Line 3: The text should be changed to read "Figure 1-3 shows the layout of the process areas at the facility prior to 1975."

- * Page 1-11, Line 7: The text should further specify that the methods employed for the disposal of the TCE and cutting oil mixture are unknown. Whatever additional information ESC has to provide on this subject should be qualified as being speculative if facts are unknown.
- * Page 1-11, Line 4: Given the discussion presented in EPA's December 11, 1990 RI comments, consideration should be given to modifying the RI to include the sumps and vapor degreaser area as potential sources of contamination.
- * Page 1-17, Line 2: Due to the poor copy quality, some areas of the text on Figure 1-5 are illegible, thus the waste drum storage area is not readily identifiable.

Page 1-17, Line 13: The present wording of the text is misleading. A sentence should be added which indicates that pertinent information from the referenced source is discussed in subsequent sections.

Section 2.0 - Physical Characteristics of the Study Area:

- * Page 2-11 (Previous Comment): EPA's comment remains valid and must be addressed. The limited number of deepwells in the highest contaminated area and limited sampling data from these wells does not allow EPA to disregard the potential for existence of contamination at greater depth; although the data base to date does not suggest this. The need for a deeper well in line between the highest contaminated well and the recovery well may be warranted. Since the recovery well does not capture all contaminated groundwater within the cone of influence a deeper well may be necessary in the future to further evaluate the recovery system if it remains in place.

- * Page 2-20, Line 2: EPA's comment remains valid. This section presents population and land use information; thus, the discussions pertaining to groundwater contamination potentially attributable to septic tanks are not appropriate in this section.

Section 3.0 - Initial Remedial Measures:

- * Page 3-10,12 (Previous Comment) EPA's comment remains valid. Additional data is required in order to characterize the plume outside of the former NCR property boundary.

Section 4-0 - Study Area Investigation:

- * Page 4-53, Line 3,4: EPA's comment remains valid. The text must be clarified as neither the pH differences nor different sample depths are identified in the discussion. Perhaps separate discussions of the shallow and deep sediment samples is necessary.
- * Page 4-48: Since the Ambient Water Quality Criteria (AWQC) for hexavalent chromium is 11 ug/L and the detection limit for hexavalent chromium for the December 1987 surface water sampling event was 20 ug/L, the statement that the samples were below the AWQC should be deleted.
- * Page 4-66, 4.6.1, Table 4-18: As the noted analytical result is one of the highest from the sampling round and is associated with a "background" well, it warrants further discussion. Despite the limitations of the analytical method, the data must be of some value otherwise the method should not have been used nor should the data have been reported in the RI. This issue can be clarified by including the new analytical data from the background well and a discussion of the past and latest results.
- * Page 4-103, Paragraph 1 and Page 4-107, Paragraph 3: The EPA comments remain valid. If questions/concerns arise from the summaries that are presented, they should be addressed. The summary should include a discussion of the mortality in the control treatment.

Section 5.0 Nature and Extent of Contamination

- * Page 5-8, Line 21: Contrary to the response, the May, 1990 analytical results indicate chromium

concentrations up to 205 ug/kg in the suspected fill area. The May 1990 data should be briefly summarized and the Supplemental Soils Report should be referred to for details.

- * Page 5-10, Line 9: Table 4-2 (not 4-1) indicates that the 17.0 ug/kg TCE was detected at a depth of 2-4 feet below grade (i.e., above the water table). This section of the text must be rewritten.
- * Page 5-11, Second bullet: The explanation provided in the response must be provided in the RI.
- * Page 5-12 (Previous Comment): EPA's comment remains valid and the text of the RI must be revised to adequately address it. It should be acknowledged in the RI Report that there is potential for TCE to exist in groundwater under the building.

Page 5-15, Line 2: EPA's comment is still valid. Page 5-11, 12 states "For the purposes of defining the extent of TCE in the soils and vadose zone, the results from the soil gas survey, soil sampling, and groundwater sampling have shown that there are three [emphasis added] primary areas to be considered...It is concluded that these three sources of halogenated organics are the only ones of significance."

- * Page 5-16: The legend must indicate what the dashed line represents.

Page 5-17: It should be stated that the analytical data collected to date indicates that TCE above 5 ug/L has been found in the interval between the water table surface and a depth of approximately 50 feet below grade.

- * Page 5-19: The reference should be Appendix D, and EPA has commented that the modeling performed by ESC is not adequate to address long term exposure. The potential for emission controls on the air stripper, if used for remedial action, must be acknowledged in the FS and fully evaluated in the remedial design phase.
- * Page 5-19: The report states, "the toxicants of concern at the site are not typically released to ambient air by natural processes." However, as mentioned in the original comments submitted for this RI report, the primary fate of TCE in surface soil (or surface water) is volatilization. Therefore, the foregoing statement is inaccurate and misleading, and should be clarified or deleted from the report.

- * Table 5-1: This Table presents the highest concentrations reported for several metals in monitoring well samples. However, as cited in the original comments for this RI report, there is no indication with regard to which results represent unfiltered samples and which are indicative of filtered analyses. This information should be provided in the final report.
- * Page 5-20, Line 22: EPA's comment remains valid. A statement to the effect that "conditions have generally improved" is still not accurate.
- * Table 5-2: The precise definition of "not detected" is a very critical issue and the major point of the original comment.

If the Contract Required Detection Limit (CRDL) of 10 ug/l was the determining factor for whether vinyl chloride was described in the report as a "non-detect", then a potentially profound exposure Reasonable Maximum Exposure scenario, 9.9 ug/l of vinyl chloride in a potable source (which, hypothetically, could have been described as a "non-detect" in the report) poses an elevated carcinogenic risk of 5×10^{-4} , or 5 additional cancers per 10,000 exposed individuals. Such a threat to public health would be deemed "unacceptable", based upon EPA guidance.

If, on the other hand, the Instrument Detection Limit, which should be significantly lower than the CRDL, was used as the benchmark for reporting "non-detects", then it may be rational to assume that contamination of ground water by vinyl chloride is not a problem at the site at this point in time.

In any case, the exact definition of "not detected" should be clearly delineated in the report (including Table 5-2).

Section 7.0 - Risk Assessment:

- * Page 7-26 - Table 7-7: Telephone conversations with representatives of the Carcinogen Assessment Branch of EPA indicate that the carcinogenic status of tetrachloroethylene (PCE) and trichloroethylene (TCE) will remain unchanged from the previous classification. That is, it has been recommended by EPA's expert review has been recommended by EPA's expert committee that PCE and TCE retain a carcinogenic weight of evidence of B2 (Probable Human Carcinogen) via the ingestion and inhalation routes of exposure.

* Page 7-38: According to page 7-38 of the report, the maximum levels of contaminants in ground water were not used in the upper bound risk calculations because "such an approach would significantly overstate potential exposures". However, in an effort to afford maximum protection to the general public, as well as to sensitive subpopulations, the EPA adheres to a conservative approach for calculating risk. In this regard, when assessing theoretical risks, it may not be not inappropriate or unreasonable to assume that a private well could inadvertently be installed in the most contaminated area of a contaminant plume (in the absence of long-term site remediation). Essentially, performing risk calculations in the RI report for the most highly contaminated ground water concedes that the foregoing scenario is a possibility, albeit unlikely. Although conducting risk calculations of this nature will not have an impact on the outcome of the investigation or subsequent remediation, for the sake of consistency, this approach should be considered for inclusion in the final RI report.

CDM FEDERAL PROGRAMS CORPORATION

January 24, 1991

Ms. Roberta Riccio
U.S. Environmental Protection Agency
841 Chestnut Building, 6th floor
Philadelphia, PA 19107

PROJECT: EPA CONTRACT NO.: 68-W9-0004
DOCUMENT NO.: TES7-C03031-EF-CCJB
SUBJECT: Work Assignment C03031
NCR Corporation
Review of Proposed Response to the
Draft Remedial Investigation Report Comments

Dear Ms. Riccio:

The purpose of this letter is to present the findings of the CDM FEDERAL PROGRAMS CORPORATION (FPC) review of the PRP's proposed response to the comments pertaining to the NCR Corporation, Millsboro, Delaware draft Remedial Investigation Report (RI). The response was submitted by Environmental Strategies Corporation (ESC) in a letter to Mr. Dilip Hansalia, Delaware Department of Natural Resources and Environmental Control, dated January 14, 1991.

In summary, based upon the submitted ESC response, the majority of comments submitted by EPA pertaining to the draft RI appear to be adequately addressed. Comments that have not been addressed or responses which are deemed inadequate are identified in Attachment 1.

If you have any questions or comments concerning the findings of this review, please contact me at (215) 293-0450.

Sincerely,

CDM FEDERAL PROGRAMS CORPORATION


Bruce R. Pluta
Work Assignment Manager

Attachment

cc: Elaine Spiewak, EPA Regional Project Officer, CERCLA Region III
Jean Wright, EPA TES VII Project Officer
Constance V. Braun, FPC Program Manager

Attachment 1

AR308256

Review Comments
Proposed Response to the
Draft Remedial Investigation Report Comments

Section 1.0 Introduction

Page 1-5: Page numbers should be added to all Figures and Tables.

Page 1-8, Line 3: The text should be changed to read "Figure 1-3 shows the layout of the process areas at the facility prior to 1975."

Page 1-11, Line 7: The text should further specify that the methods employed for the disposal of the TCE and cutting oil mixture are unknown.

Page 1-11, Line 4: Given the discussion presented in EPA's December 11, 1990 RI comments, consideration should be given to modifying the RI to include the sumps and vapor degreaser area as potential sources of contamination.

Page 1-12 (Previous Comment): The response does not indicate that EPA's comment was addressed in the RI. The response itself does not address EPA's comment.

Page 1-17, Line 2: Due to the poor copy quality, some areas of the text on Figure 1-5 are illegible, thus the waste drum storage area is not readily identifiable.

Page 1-17, Line 13: The present wording of the text is misleading. A sentence should be added which indicates that pertinent information from the referenced source is discussed in subsequent sections.

Section 2.0 Physical Characteristics of the Study Area

Page 2-11 (Previous Comment): EPA's comment remains valid and must be addressed.

Page 2-20, Line 2: EPA's comment remains valid. This section presents population and land use information; thus, the discussions pertaining to groundwater contamination potentially attributable to septic tanks are not appropriate in this section.

Section 4.0 Study Area Investigation

Page 4-32: EPA's comment remains valid. It is clear that the two events are different and the data is not quantitatively correlated. Careful preparation of the requested figure would ensure that these concerns are clearly noted.

AR308257

Page 4-53, Line 3,4: EPA's comment remains valid. The text must be clarified as neither the pH differences nor different sample depths are identified in the discussion.

Page 4-54, 55 (Previous Comment): The response does not indicate that the RI has been revised to address EPA's comment. The requested discussion must be included in the RI.

Page 4-66, 4.6.1, Table 4-18: As the noted analytical result is one of the highest from the sampling round and is associated with a "background" well, it warrants further discussion. Despite the limitations of the analytical method, the data must be of some value otherwise the method should not have been used nor should the data have been reported in the RI.

Page 4-103, Paragraph 1 and Page 4-107, Paragraph 3: The EPA comments remain valid. If questions/concerns arise from the summaries that are presented, they should be addressed.

Section 5.0 Nature and Extent of Contamination

Page 5-8, Line 21: Contrary to the response, the May, 1990 analytical results indicate chromium concentrations up to 118 ug/kg in the suspected fill area.

Page 5-9, Line 17: The response provided is inadequate. There is no indication that the statement has been qualified and a discussion of the results has been added.

Page 5-10, Line 9: Table 4-2 (not 4-1) indicates that the 17.0 ug/kg TCE was detected at a depth of 2-4 feet below grade (i.e., above the water table). This section of the text must be rewritten.

Page 5-11, Second bullet: The explanation provided in the response must be provided in the RI.

Page 5-12 (Previous Comment): EPA's comment remains valid and the text of the RI must be revised to adequately address it.

Page 5-15, Line 2: EPA's comment is still valid. Page 5-11,12 states "For the purposes of defining the extent of TCE in the soils and vadose zone, the results from the soil gas survey, soil sampling, and groundwater sampling have shown that there are three (emphasis added) primary areas to be considered...It is concluded that these three sources of halogenated organics are the only ones of significance."

Page 5-16: The legend must indicate what the dashed line represents.

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Page 5-20, Line 22: EPA's comment remains valid. A statement to the effect that "conditions have generally improved" is still not accurate.

Section 7.0 Risk Assessment

Page 7-15, Line 23 (Page 7-15) (Previous Comment): EPA's comment remains valid. While the BCM data cannot be used for quantitative purposes, given the relatively limited and focused soil boring program implemented during the RI, this data must be noted and considered (at least qualitatively).

AR308259



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

FEB 22 1991

Mr. Dilip Hansalia
State of Delaware
Division of Air & Waste Management
Department of Environmental Resources
and Environmental Control
715 Grantham Lane
New Castle, Delaware 19720

Subject: Review of proposed responses to the NCR Supplemental
Soils Investigation Report.

Dear Dilip:

It appears that most of the comments presented by EPA and CDM have been addressed in ESC's responses. EPA, however, still disagrees with the conclusion stated on page 52 of the revised report. In addition, there has been no specific response made to CDM's comment pertaining to this conclusion. Although laboratory analytical results indicate that the TCE contamination was not detected below 4.5 feet this same conclusion cannot be made from review of headspace analysis and field screening data. Headspace analysis and field screening data indicate a potential for contaminants to exist below the 4.5 feet.

EPA supports CDM's recommendation that a comparison of headspace analysis and field screening data to the analytical data be performed to further define the vertical extent of contamination.

EPA is in general agreement that the levels of TCE and chromium detected in soil to date do not pose a direct contact risk to the public health; however, continued monitoring of groundwater should occur to ensure that levels of TCE and chromium are not impacting the groundwater at the site. To date, there have been no significant levels of TCE and chromium detected in wells installed in the area of the Supplemental Soils investigation area.

AR308260

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I am enclosing a copy of the CDM-FPC comments for your review. Please contact me if you have any questions regarding these comments.

Sincerely,

Roberta Riccio
Roberta Riccio,
Remedial Project Manager
DE/MD Section (3HW25)

Enclosure

cc: Bruce Pluta, CDM-FPC
Dawn Ioven (3HW11)
Philip Rotstein (3HW24)

AR308261

CDM FEDERAL PROGRAMS CORPORATION

February 13, 1991

Ms. Roberta Riccio
U.S. Environmental Protection Agency
841 Chestnut Building, 6th floor
Philadelphia, PA 19107

PROJECT: EPA CONTRACT NO.: 68-W9-0004

DOCUMENT NO.: TES7-C03031-EP-CCZC

SUBJECT: Work Assignment C03031
NCR Corporation
Review of Proposed Response
to the Supplemental Soils
Investigation Report Comments

Dear Ms. Riccio:

The purpose of this letter is to present the findings of the CDM FEDERAL PROGRAMS CORPORATION (FPC) review of the PRP's proposed response to the comments pertaining to the NCR Corporation, Millsboro, Delaware Supplemental Soils Investigation Report (SSIR). The response was submitted by Environmental Strategies Corporation (ESC) in a letter to Mr. Dilip Hansalia, Delaware Department of Natural Resources and Environmental Control, dated January 18, 1991.

In summary, based upon the submitted ESC response, the majority of comments submitted by FPC pertaining to the November 7, 1990 SSIR appear to be adequately addressed.

It should be noted that the only FPC comment not addressed was that pertaining to page 52, 1st full paragraph of the SSIR. No proposed response was provided by ESC relative to this comment. This comment stated:

As noted above [comment pertaining to page 49, headspace analysis of a sample from a depth of 6 feet indicated VOC concentrations of 300 ppm] and, as is noted by ESC on page 49, contamination is not limited to four feet of depth. This conclusion must be corrected.

Ms. Riccio
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It is again recommended that field screening and headspace analysis data be compared with the analytical data to more accurately define the vertical extent of contamination. It appears that the current interpretation of the vertical extent of contamination was based solely upon the laboratory data.

If you have any questions or comments concerning the findings of this review, please contact me at (215) 293-0450.

Sincerely,

CDM FEDERAL PROGRAMS CORPORATION

LRH

Bruce R. Pluta
Work Assignment Manager

cc: Elaine Spiewak, EPA Regional Project Officer, CERCLA Region III
Jean Wright, EPA TES VII Project Officer
Constance V. Braun, FPC Program Manager

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